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REVIEW OF THE ECONOMIC VALUE OF EXCESS NAVAL AIRCRAFT AT THE AEROSPACE MAINTENANCE AND REGENERATION CENTER

by

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September, 1996

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The Aerospace Maintenance and Regeneration Center (AMARC) stores aircraft that are determined to be excess. These aircraft are preserved awaiting future regeneration, sale to foreign governments, reclamation of their components, or disposal. The present programs provide substantial return to the Department of Defense. The primary objective of this study is to review the present system and develop recommendations to optimize the financial return.

To address this issue, interviews were conducted with key personnel in AMARC, the Navy, and DRMO. Current instructions were reviewed, and required data was collected. Analysis of the data and structure of the process revealed many areas which could be improved. The recommendations involve both immediate and long-term financial benefits, and include; more efficient disposition planning for newly arriving and stored aircraft, increasing the effectiveness of the reclamation program, adopting aggressive marketing techniques and incentive plans for aircraft parts sale, and stabilizing the Unit Standard Price (USP). Implementing any of the recommendations should provide a higher return on excess aircraft and aircraft parts than is presently realized.

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REVIEW OF THE ECONOMIC VALUE OF EXCESS NAVAL AIRCRAFT AT THE AEROSPACE MAINTENANCE AND REGENERATION CENTER

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ABSTRACT

The Aerospace Maintenance and Regeneration Center (AMARC) stores aircraft that are determined to be excess. These aircraft are preserved awaiting future regeneration, sale to foreign governments, reclamation of their components, or disposal. The present programs provide substantial return to the Department of Defense. The primary objective of this study is to review the present system and develop recommendations to optimize the financial return.

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I. INTRODUCTION

My research will review and compare the methods to recover value from excess aircraft located at the Aerospace Maintenance and Regeneration Center (AMARC) and how the Navy uses this facility. This thesis will focus on the Department of Defense (DoD) storage, reclamation and final disposal of aircraft and aircraft parts as it pertains to the Navy. The primary emphasis is optimizing the present systems to realize the maximum financial benefit.

The present programs for disposing of excess aircraft provides substantial return to the Department of Defense (see Table 1.1 and Figure 1.1). The reclamation program returns useable parts back into the inventory, the sale of aircraft and aircraft parts to foreign governments and the private sector returns dollars back to DoD, and donations (museums, schools, State and Local agencies, etc.) contribute to goodwill and recruitment. Improvements in the practices and efficiency of excess aircraft disposition can only increase the financial return. This thesis will also review DoD practices and make recommendations to achieve a higher return on DoD's initial investment.

A. BACKGROUND

AMARC dates back to April 1946 when the 4105th Army Air Force Base Unit was formed at Davis-Monthan AFB, Tucson, Arizona. This unit stored surplus Army Air Corp aircraft and prepared them for one-time flights to depots for overhauls. During the same year, the Navy established a separate storage facility at the U. S. Naval Air Facility at Litchfield

(Dollarrs X 1,000)	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95
Aircraft withdrawn (value)	222.90	434.80	382.70	334.40	547.00	424.00
Parts Reclaimed (value)	350.00	374.40	297.00	399.90	448.00	366.00
other (value)	7.90	4.00	0.00	0.00	0.00	0.00
Total Savings to DOD	580.80	813.20	679.70	734.30	995.00	790.00
AMARC Expenses	32.70	36.40	36.50	50.13	49.00	46.00
Savings per dollar invested	**17.76**	**22.34**	**18.62**	**14.65**	**20.31**	**17.17**

Table 1.1. Reclamation Program Cost Recovery

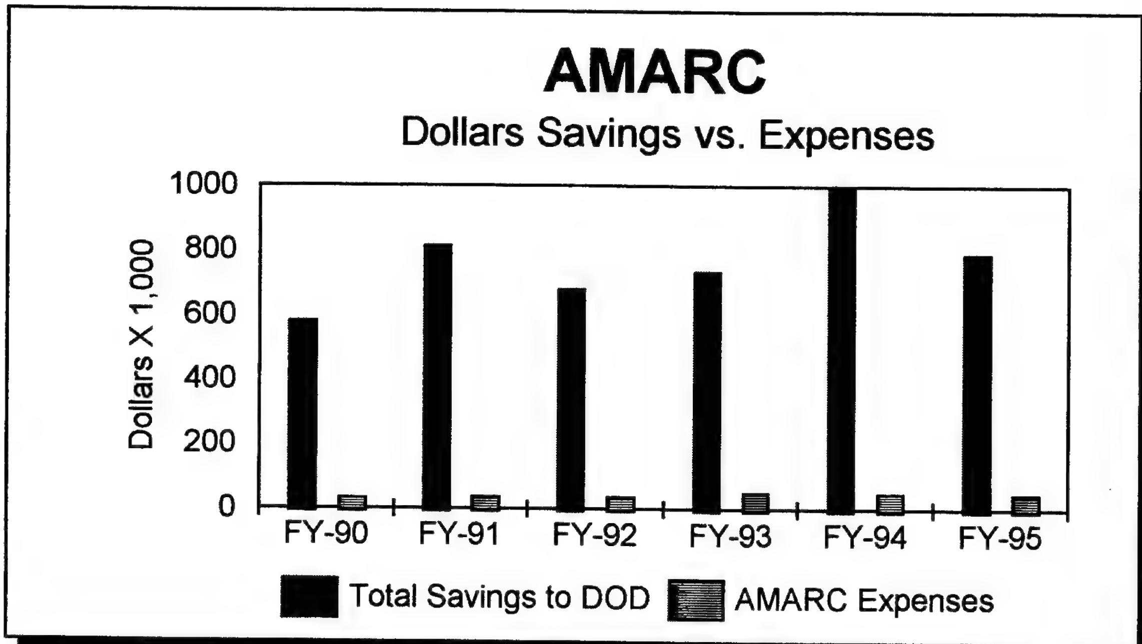

Figure 1.1. AMARC Expense vs. Value Recovery

Park, Arizona. Both sites were chosen because of their favorable weather conditions ; low annual rainfall, arid conditions, and hard alkali soil content which provides an ideal environment for aircraft storage. In 1947, the USAF was created and unit's name was changed to the 3040th Aircraft Storage Depot. Its mission was expanded to include reclamation.

In December 1963, the Assistant Secretary of Defense (Installations and Logistics) directed the Air Force and Navy to consolidate their existing aircraft storage facilities into a single operation. In July 1964, Davis-Monthan Air Force Base was selected as the location for consolidated storage and disposal functions, including reclamation, for all military service aircraft not immediately required by the DoD. In February 1965, the name was changed to Military Aircraft Storage and Disposition Center (MASDC); the Center became the storage facility for aircraft from all services. [Ref. 1] By September 1966, all 998 Navy aircraft had been transferred from the Litchfield Park Facility to Davis-Monthan Air Force Base. From October 1985 to the present, the Center has been known as the Aerospace Maintenance and Regeneration Center (AMARC). This name emphasizes that the center is an active industrial complex that primarily promotes the regeneration of aerospace assets.

The center has several missions, it stores and maintains aircraft for future return to service, or holds in reserve as an inventory for out of production aircraft parts. It withdraws aircraft from storage, reclaims or removes parts, and prepares aircraft for sale to other nations. It also prepares aircraft for disposal to the private sector after they are no longer needed and all useable parts have been reclaimed. More than 700 employees work on over

50 different types of aircraft. Historically, 25% of the aircraft received for storage are eventually prepared for flight or ground shipment to support its customers needs (Table 1-2). For the period of FY 75 to FY 95 (excluding FY 87 & 88), the actual data was 8,984 arrivals

FY	Arrivals	Total Depart.	Percent Dep:Arr	Flight Depart.	Overland Departures
95	496	166	33.47%	44	122
94	735	211	28.71%	89	122
93	671	166	24.74%	82	84
92	996	157	15.76%	74	83
91	645	209	32.40%	65	144
90	422	155	36.73%	44	111
89	336	285	84.82%	50	235
88	no data	67	n/a	unknown	unknown
87	no data	116	n/a	74	42
86	308	167	54.22%	49	118
85	220	236	107.27%	67	169
84	249	194	77.91%	164	30
83	225	298	132.44%	197	101
82	250	139	55.60%	40	99
81	167	270	161.68%	214	56
80	162	224	138.27%	82	142
79	471	270	57.32%	212	58
78	458	161	35.15%	47	114
77	425	158	37.18%	62	96
76	752	282	37.50%	60	222
75	995	132	13.27%	37	95
Total (excl. 87 & 88)	**8984**	**3880**	**43.19%**	**1679**	**2201**

Table 1.2. Aircraft Arrivals to Departures (FY 75 - FY 95)

and 3,880 departures, for 43.19%. The pattern of aircraft arrivals also parallels post-Vietnam and current drawdowns which dictate workload over the long-term.

From 1965 to 1972, a total of 625 aircraft were regenerated and over 259,000 parts reclaimed from storage to support the Vietnam War effort. During Operation Desert Storm, parts from AMARC aircraft kept B-52, F-111, F-4, OV-10, C-130, A-7, and P-3 aircraft flying. When production of older aircraft cease, the center may be the sole source for parts. However, aircraft are regenerated for other purposes as well.

Recently, 21 AT-38's were regenerated to train Taiwanese pilots at Holloman AFB, 189 F-106's were used as drones for airborne targets, 50 A-10's were transferred to the Turkish AF through the Foreign Military Sales (FMS) Program, P-2's have been used as water-droppers for forest fire fighting, and regenerated O-2's were used in Africa to spot poachers. AMARC's regeneration program is so successful that after almost 14 years in storage, 312 F-100 aircraft were launched to be used as drones, and a C-47 that had been in storage for 50 years left under its own power for another cargo mission. [Ref. 2]

The Center has many additional duties. In accordance with the Strategic Arms Reduction Treaty, 363 B-52's are being eliminated by a 13,000 pound guillotine. The center also stores 107,000 production tooling pieces, 51 Titan Missiles, 48 Communication-Electromagnetic-Meteorological (CEM) vans, and 114 photo labs.

The Center is a large facility which covers over 2,700 acres, contains 78 real property buildings, and a FY-95 operating budget of $46 Million dollars. It stores 5,064 aircraft (1,778 Navy). This is the largest concentration of aircraft in the world. These assets have

an acquisition value of $16.5 Billion dollars. With the 'right-sizing' still in effect, the Center will play a prominent role in disposing of the aircraft no longer needed in the force structure.

B. RESEARCH QUESTIONS

1. Primary Research Question

What is the optimum program for maximizing the economic value of excess Naval aircraft located at the Aerospace Maintenance and Regeneration Center?

2. Secondary Research Questions

a. How is the aircraft parts reclamation program managed at AMARC?

b. How can DoD maximize the return from the reclamation program?

c. How are excess aircraft and aircraft parts disposed of after parts are reclaimed?

d. What are the costs associated with reclamation and disposal of excess aircraft at AMARC?

e. Are there any constraints which hinder the sale of aircraft and aircraft parts?

f. How does the private sector differ from DoD in the disposition of excess aircraft and parts parts?

g. Is the DoD making every effort to sell excess aircraft and aircraft parts at net realizable value (NRV)?

C. SCOPE

This thesis focuses on the interaction between AMARC and the Navy, with mention of the Defense Reutilization and Marketing Office (DRMO) and the Federal Aviation Administration (FAA) as applicable. Although each service may vary in requirements and policies, the basic procedures remain the same.

D. METHODOLOGY

Research data was obtained through the review of published academic writings, government audit reports, periodicals, personal and telephone interviews, and observations and data collected at AMARC. The personnel interviewed included: all members of the Navy Field Support Office, personnel at multiple levels and facets of the AMARC organization, DRMO Tucson staff, Navy Inventory Control Point, and Naval Aviation Depot Alameda.

A thorough review was conducted of all current applicable instructions pertaining to the disposition of excess military aircraft and the AMARC facility. Past audit reports on the subject provided a cornerstone for topic research and development for area follow-up and attention focus.

E. ORGANIZATION OF THESIS

This chapter introduces the DoD's efforts for Naval aircraft storage, reclamation, and disposal, the objectives of this research paper, and potential beneficaries from this study. Chapter II reviews the present system and organizations. Chapter III presents the data

collected. Chapter IV evaluates and analyzes the data presented in Chapter III. Recommendations, conclusions, answers to the research questions, and suggestions for further research will constitute Chapter V.

F. BENEFITS OF STUDY

In this time of fiscal constraint brought on by an ever decreasing DOD budget, ensuring the maximum financial return of investment dollars is crucial. Optimizing the processes at AMARC will create a more cost effective entity. These cost savings will then be returned to the customers through reduced standard rates (DBOF rates) and more effective use of excess aircraft which will reduce future aircraft parts procurement. This benefits not only the Navy, but other customers, primarily the Army, Air Force, and various organizations and countries utilizing this facility.

II. PRESENT SYSTEM

A. AEROSPACE MAINTENANCE AND REGENERATION CENTER (AMARC)

AMARC was designated a Depot Maintenance Business Activity (DMBA) in 1991. Prior to 1991, the Center operated as a similar Industrial Fund activity. A DMBA is a Defense Business Operating Fund (DBOF) activity which is designed around unit cost accounting and a 'revolving pot of money' concept with a break-even financial goal. Section E.1. of this chapter discuss this philosophy in depth.

AMARC is organized in a matrix structure, as depicted in Figure 2.1. Although AMARC falls under the leadership of the Air Force Material Command, it operates as an individual business, with all but four of the employees being civilian. The head of the organization is an Air Force Colonel, of the remaining three military personnel, one USAF officer works in the financial section, and two Navy enlisted personnel are assigned to the Navy Field Service Office (FSO).

As illustrated in Figure 2.1, AMARC consists of four departments, overseeing 3 processes, servicing three primary customers (three major services), and many secondary customers (see Figure 2.2). The three processes are: Process-In, Reclamation, and Process-Out. AMARC's work process priorities are as follows [Ref. 3]:

1. Priority reclamation.
2. Contingency mobilization aircraft preparation/represervation.
3. Aircraft withdrawals.
4. Process-in of aircraft.

5. Maintenance in storage.

6. Representation of aircraft.

7. Routine reclamation.

8. Special tools / special test equipment.

9. Museums.

10. Defense Reutilization and Marketing Support.

11. Center facility support.

1. Process-In

The Process-In operation prepares aircraft for short and long-term storage and maintains them while they are in storage. This process encompasses three interrelated phases: initial preservation / in-processing, storage, and represervation.

a. Initial Preservation / In-Processing

Thirty days prior to an aircrafts arrival, the principal will provide AMARC with the category of preservation requested. The preservation process varies from full preservation to limited preservation. The full preservation process begins after the ejection seats, canopy jettison, and all classified equipment are removed, and a complete inventory is performed . Full preservation is a three step process:

1. Flush farm - the standard engine oil is replaced with light weight oil and the engines are run for a short time to fully lubricate the engines. The engines are drained and the remaining fuel system is flushed with the same light weight oil, leaving a protective coating.

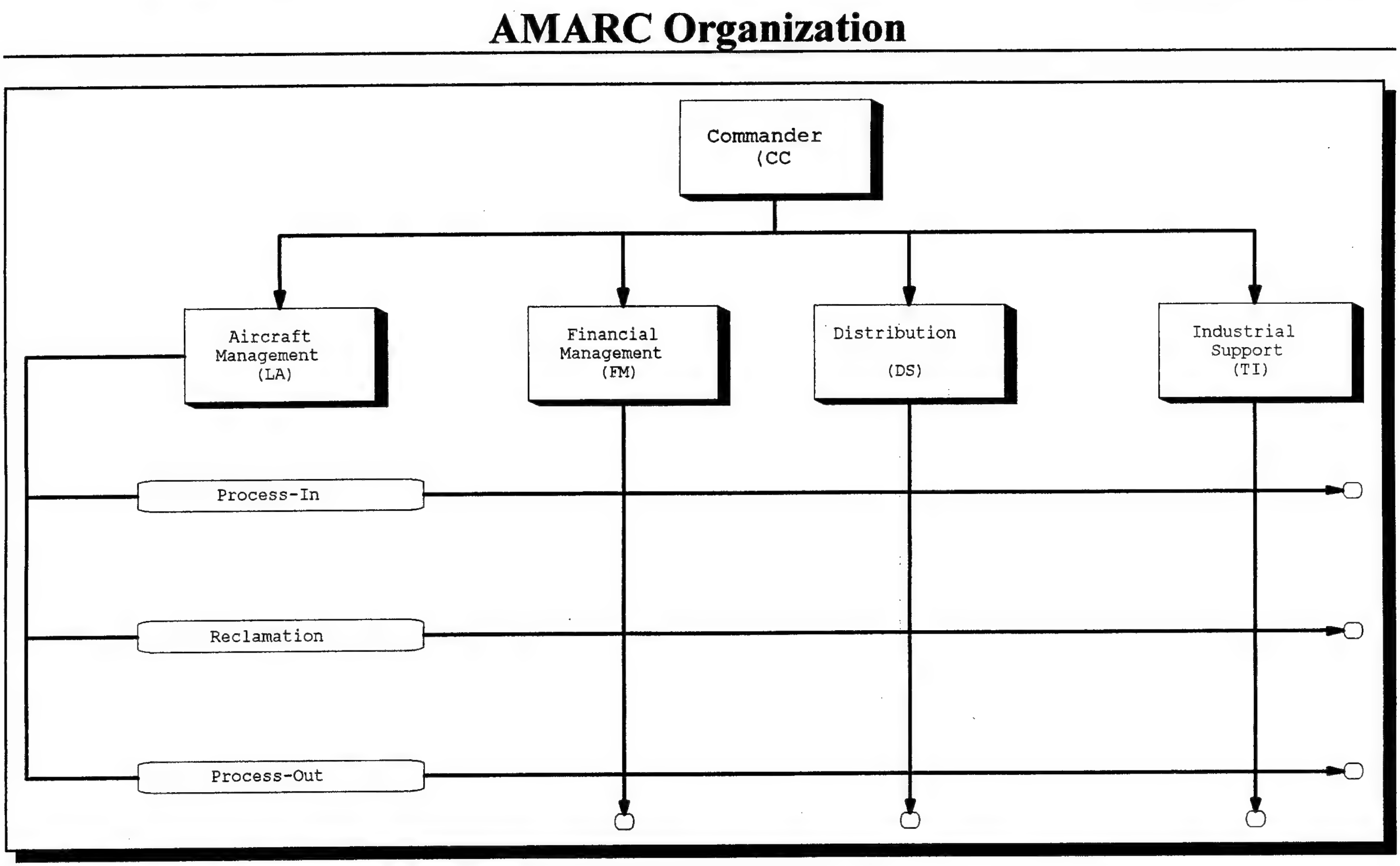

Figure 2.1. AMARC Matrix Organizational Structure

2. Corrosion control - entire aircraft exterior is washed and lubricated to prevent corrosion.

3. Sealing - all entryways are sprayed with two layers of water-proof latex (Spraylat) to keep dirt and moisture out. The top coat is white Spraylat to keep out heat. In the summer, temperatures inside unprotected aircraft can reach 200 degrees Fahrenheit, causing damage to rubber, plastic, and delicate electronic components. With a Spraylat covering, the internal temperatures remain within 10 - 15 degrees of the ambient temperature.

Upon arrival of the aircraft at AMARC, the principal may elect to remove selected items for immediate reclamation, to satisfy high priority requirements. This program is called the Mini-Save program. The Mini-Save program has the following restrictions:

- the aircraft may not be assigned to an inviolate state.
- the reclaimed item must be > $500 in value.
- removal must not immobilize or impair the aircraft process-in or subsequent representation.
- removals must not degrade the aircraft and preclude returning it to a flyable status.

b. Storage

After an aircraft has completed the in-process and preservation phase it is taken to a pre-designated area of AMARC to be stored. The type of storage for which the

aircraft is prepared reflects the level of preservation requested.

There are four types of storage:

- 1000 storage - The aircraft will eventually fly. It is inspected every 6 months and re-preserved every 4 years. The integrity of the aircraft systems is maintained.
- 2000 storage - The integrity of the parts/components is maintained. Systems, parts, and components are removed and returned to active service.
- 3000 storage - The aircraft is maintained in a flyable hold status pending sale or transfer. The maximum time allowed is 90 days, however, an extension may be granted for an additional 90 days if the situation warrants. This type of storage is normally used by assets participating in the Foreign Military Sales (FMS) Program.
- 4000 storage - Utilized for aircraft awaiting disposal.

A special category of excess property, Reclamation Insurance Type (RIT), supports unprojected future reclamation requirements. The principal may designate a quantity, usually five or less, of a single Type/Model/Series (TMS) to be held in RIT status. These aircraft are to be used as a supply source for items not normally stocked and for major structural items or sections. Maintenance is performed on RIT aircraft on a case-by-case basis, as authorized by the principal. The AMARC Business Office Division, and AMARC/LG (3) must periodically, but not less than twice a year, inspect RIT property.

While the aircraft is in storage, all aircraft and aircraft engine records / log books are maintained in accordance with (IAW) the principal's directives, and will accompany the aircraft upon transfer, regeneration, or disposal.

c. *Representation*

Aircraft designated as an inviolate asset are represerved every four years. This process involves removing the existing preservation, starting the engines and system components, making appropriate repairs, and re-preserving the aircraft.

Navy Field Service Office (FSO) and AMARC personnel regularly inspect all assigned aircraft for damage or breaches in the preservation. Any discovered damage or violations of preservation are corrected immediately.

2. Reclamation

Reclamation is the process of salvaging required components from excess or obsolete aircraft. These parts are then placed back into the supply system for future re-utilization.

The reclaiming activity shall then assign a MILSTRAP Supply Condition Code (SCC) to the reclaimed asset. There are three codes: "A" (serviceable), "F" (unserviceable [repairable]), and "R" (reclaiming activity does not have the capability to verify the condition of the reclaimed asset). All items removed by AMARC will be condition checked, within the Centers' capability. If required, AMARC will apply protective coating/paint to protect the items after non-destructive inspection (NDI). The reclaimed asset is then furnished to the ICP on a nonreimburseable basis. The requisitioning activity fully reimburses AMARC, through

ASO, for the cost of reclamation and transportation. Reclamation costs include removing item, tagging them, and annotating removal notices. The recorded stock list price is used as the value of reclaimed items. All parts removed from an aircraft, while at AMARC, are documented in a negative inventory log for that specific aircraft. This log helps determine what components the aircraft possesses, information that is imperative for future priority reclamation, and what components must be replaced before regeneration, sale, or transfer.

AMARC always accord the military agency previously owning the aircraft first priority for obtaining reclaimed parts unless a different agency has requirements for the next higher assembly. After the prior owning agency's requirements have be filled, AMARC honors additional reclamation requirements from any agency on a "first come, first served" basis. Approval from the previous owning service is not required.

After completing the reclamation programs, aircraft may be placed in RIT. RIT aircraft support follow-on requirements:

- Major structural components
- Other items not stocked as spares
- Additional spares to meet unanticipated program changes
- Providing out-of-production parts for older TMS aircraft

Whenever property has undergone such extensive reclamation that minimal residual value remains, authorization for disposal is requested from the appropriate service system program management organization.

There are three methods of reclamation:

a. Routine Reclamation

Includes both programmed and nonprogrammed:

(1) Programmed - reclamation of excess property in such volume as to warrant a scheduled project to reclaim all known components. This method is synonymous with the 'chop shop' parts recovery technique. To ensure the maximum utility is achieved from each programmed reclamation requires data interchange. AMARC generates a Master Save List (MSL) which instructs the reclamation team on what parts are to be reclaimed. The MSL consolidates Save Lists generated by each service's Inventory Control Point (ICP). The Save Lists compile outstanding parts acquisition requests and projected shortfalls in the inventory system. All serviceable parts listed in the MSL are removed and returned to the supply system for future use.

(2) Nonprogrammed - reclamation of small quantities of end items from crashed/damaged aircraft. This process is normally performed on-site.

b. Priority Reclamation

This occurs in response to emergency/urgent requirements or other priority backorders which cannot be timely satisfied from routine reclamation. This involves entering a preserved or RIT aircraft and removing only the specifically requested part.

> Because of the significant cost to break preservation, remove a part, and reseal the aircraft, approval for priority removals from mobilization, FMS/SAP and inviolate aircraft shall be limited to Not Mission Capable Supply/Partial Mission Capable Supply (NMCS/PMCS) and Standard Depot Level Maintenance (SDLM) work stoppages, and in extreme cases, operational requirements. [Ref. 4]

c. *Mini-Save Program*

Previously mentioned in Section A, Subsection 1, Sub-subsection a.

3. **Process-Out**

Process-Out involves preparing an aircraft for departure from the Center. The amount of preparation is determined by the form of removal. If the asset is to be regenerated, substantial preparation must be undertaken to ensure a safe flyable aircraft. AMARC will prepare all aircraft for flight, but it is the principal's responsibility to provide Functional Check Flight (FCF) aircrew when needed.

If the aircraft is to depart by surface transportation, the preparation will depend upon the customer's requirements. If the aircraft is to be disposed of by DRMO on-site, then only demilitarization is required. The costs incurred in demilitarizing aircraft systems are charged to the service or agency who owned the aircraft before its transfer to DRMO.

AMARC ensures that all "lethal" as well as "key points" are properly identified for demilitarization on each aircraft configuration. The demilitarization instructions are documented and retained. However, AMARC does not demilitarize the airframe; that is accomplished by DRMO along with the disposal action.

After reclamation, AMARC will accomplish all screening actions necessary. When aircraft are transferred to the General Services Administration (GSA) or Defense Logistic Agency (DLA), AMARC advises the receiving agency about any FAA inspections conducted on the commercially saleable aircraft and the decisions rendered. The Center will also list the

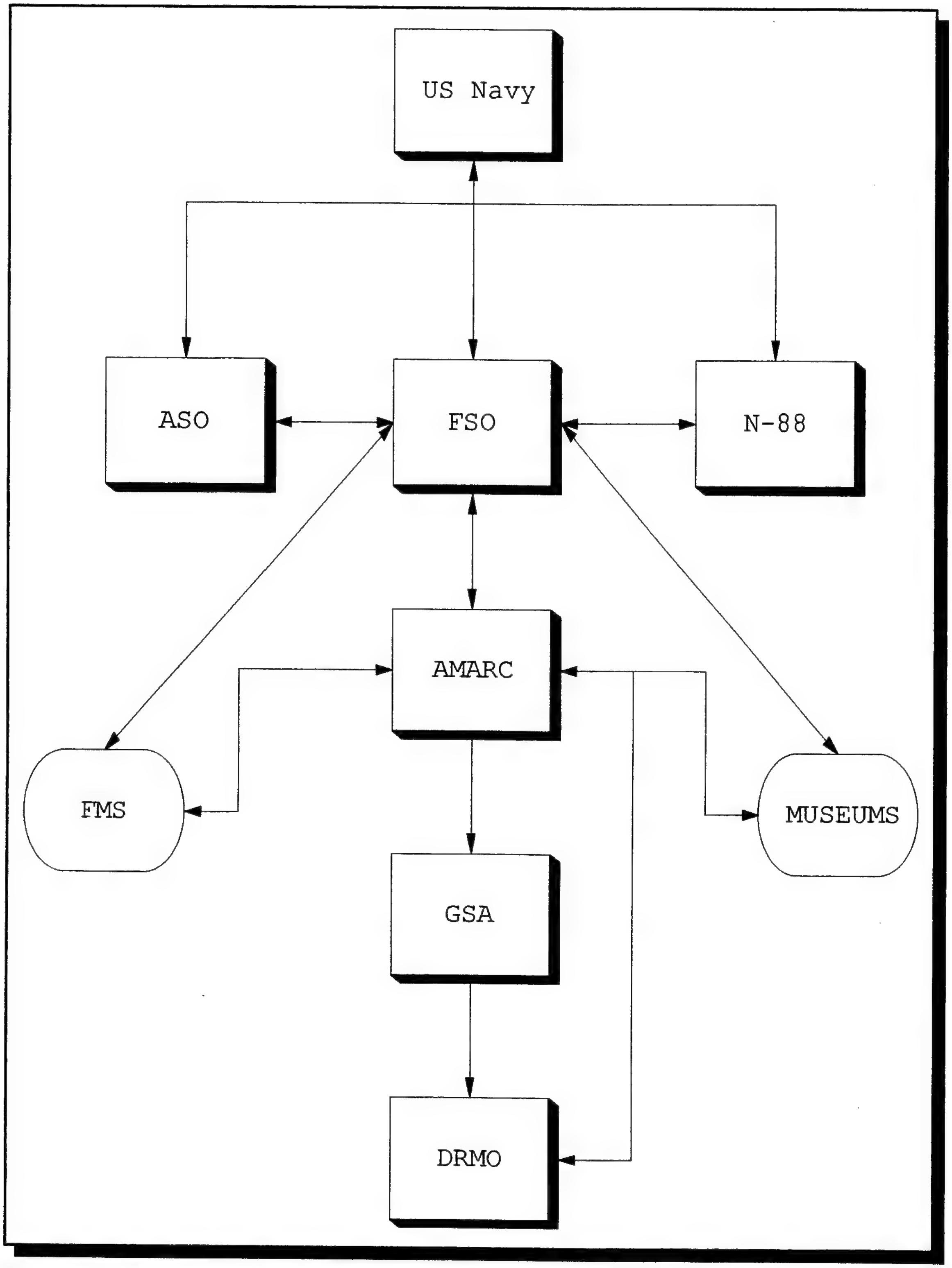

Figure 2.2. Overview of Organizational Relationships - Navy

parts or components that have been removed (negative inventory) before transferring the aircraft, and provide all available aircraft historical/modification records.

B. U. S. NAVY

All inactive aircraft are the responsibility of the Chief of Naval Operation (CNO). The CNO requires an aggressive program to strike all aircraft which cannot meet mobilization requirements. Storing aircraft is expensive and not militarily justified for aircraft that have completed their service life and/or are incapable of performing a fleet mission.

There are many justifications for military aircraft storage; the most prominent is reclamation. As stated in OPNAVINST 13000.6 [Ref. 4]:

> Reclamation is a basic source of supply and will be utilized in preference to procurement or repair to obtain components and/or items to meet current requirements when it is timely and economical to do so. Reclamation procedures will increase the availability of spare parts in the supply system and reduce cost. Monetary value will not be considered a limitation if reclamation will satisfy critical items requirements or if new procurement is impractical.

Reclamation should only salvage components in good or economically repairable condition. Although an alternative for procurement, procurement should not be delayed if assets cannot be reclaimed in a timely and economical manner. As previously mentioned, a limited number of stricken aircraft will be retained in Reclamation Insurance Type (RIT) on a long term basis. These aircraft provide parts and components that are not currently manufactured or available in the supply system.

Table 2.1 describes the five Navy categories for aircraft storage. Also illustrated are the guidelines which apply to removing and replacing parts.

Aircraft Strike Category		Part Replacement Required	Removal Authority
Section 1	Reconstitution Reserve/ Force Level Assurance	Yes (1)	CNO (N880G)
Section 2	CNO/Special Programs	No (1)	CNO (N880G)/ NAVIPO
Section 3	FMS/SAP	No (2)	ASO
Section 4	Museum Aircraft	No (3)	ASO
Section 5	Awaiting Reclamation		

Notes:

(1) Priority removals of parts from war reserve, force level assurance and CNO special programs is the last source to satisfy a parts requirement.

(2) Removal not authorized on a designated security assistance case after the Letter of Offer by the U. S. Government has been forwarded.

(3) Prior to museum trade agreement, parts can be requested via ASO.

Table 2.1. Navy Aircraft Disposition Categories and Parts Reclamation Guidelines From Ref. [4]

An informal review board (strike board) meets semi-annually to review aircraft in the inactive inventory and recommend retention, disposal, or change in status for specific aircraft. This board is hosted by the Navy Aviation Supply Office (ASO), and chaired by CNO (N880G). The result of the latest strike board can be found in Chapter III.

Three organizations are directly involved in the utilization of excess Navy aircraft: the FSO, ASO, and the Director, Air Warfare (N88).

1. Field Service Office (FSO)

As directed by the Interservice Support Agreement (ISA) [Ref. 3], the Navy maintains a resident FSO which provides direct liaison, management, and coordination between the Navy and AMARC. The FSO is responsible for all Naval aircraft in storage. The FSO contains a small contingent of five individuals (two civilian, two military, and one vacant) that work directly for the Department of the Navy (DoN). The FSO's budget reimburses AMARC for all but reclamation expenses incurred by the Navy.

2. Aviation Supply Office (ASO)

The ASO is located in Philadelphia, PA, but plays an important role in the disposition of excess Naval aircraft. As directed by CNO [Ref. 4], the ASO has the following responsibilities:

- budget and fund requirements
- maintain records on material condition and serviceability of inactive inventory
- program workload to AMARC
- direct the disposal of aircraft when stricken
- provide AMARC cost information for FMS
- make stricken aircraft available to museums
- determine parts to be removed from Stricken Aircraft Reclamation and Disposal Program (SARDIP) and provide Save Lists

The Inventory Control Point (ICP), a branch of the ASO, is intergal to the reclamation program. The ICP develops the Save List for each TMS and updates it semi-annually. ICP's are the only DoD activities that can request items directly from AMARC. Parts must not be removed from property that has been processed in, before establishing a reclamation project, unless specifically authorized. Other DoD requesters, including Reserve and National Guard activities, are referred to the proper ICP.

3. Director Air Warfare (N88)

The area of Air Warfare that manages excess aircraft is N880G. N880G prescribes optimum inventory levels, identifies the storage categories of excess aircraft, and provides strike recommendations to the Director Air Warfare Division (N88). Other duties include:

- establish inactive aircraft inventory
- approve parts removal from inviolate aircraft
- direct disposition of aircraft recommended for retention or disposal
- direct annual input and withdrawal projections

C. AIR FORCE MATERIAL COMMAND

The Air Force Material Command serves as the executive director and single manager operating agency for storage, disposal, and reclamation of aerospace vehicles for the Department of Defense. The individual services control the movement of aircraft into and out of storage. Property at AMARC is retained on the owning military service/federal agency's accountable records until released for reclamation or RIT projects. Property accountability

is also released through transfers to other DoD activities, foreign military sales actions, museum projects, donations, or DRMO. [Ref. 5]

The Air Force Special Defense Property Disposal Account (AFSDPDA) administered by the Air Force is a special disposal function for processing excess property at AMARC. This function maintains accountability and administrative control of property until processed to GSA or DRMO. The Aircraft Disposition Office, Logistics Directorate (LG{3}) is the chief of the AFSDPDA and is responsible for all property accepted into the account. [Ref 5]

AMARC provides functional supply support services, such as requisitioning, turn-in and tracking of unserviceable assets, and packing, handling, and storing of assets owned by principal. Although each customer has many service specific documentation requirements, procedures, and supply systems a common system had to be adopted by all customers. To facilitate accounting, all items of supply and equipment are processed utilizing Air Force data elements and procedures. This centralization precludes each service from establishing separate, common organizations.

D. DEFENSE REUTILIZATION AND MARKETING OFFICE

The DoD reutilization program makes excess material available to DoD activities for reuse. This precludes concurrent procurement and disposal, and eliminates the repair or overhaul of unserviceable assets when serviceable assets are available for redistribution.

The Defense Reutilization and Marketing Service (DRMS) manages the sales program for the Defense Logistic Agency (DLA). Sales are conducted on a national and local basis

through the National Sales Office (NSO) and numerous Defense Reutilization and Marketing Offices (DRMO) located worldwide. The DRMS sells primarily DoD surplus personal property . The General Services Administration (GSA) sells government owned surplus military property. This responsibility can be delegated to the local DRMO; sales of aircraft and aircraft parts are typically delegated to DRMO Tucson. The NSO implements a national sales program that includes developing marketing strategies, preparing sales catalogs, soliciting and evaluating bids, and writing sales contracts referred to it from DRMO.

The DRMO is responsible for reutilizing and marketing all DoD excess and surplus material. All aircraft are first screened by GSA to determime if the whole commercially adaptable aircraft can be sold. Aircraft not accepted by GSA are transferred to DRMO's authority. Prior to selling a service's excess aircraft and aircraft parts to the general public, a priority of needs list must be screened.

Priority of needs [Ref. 6]:

1. Transfer to another Military Service as a complete aircraft.
2. Transfer to another DoD activity as a complete aircraft.
3. Use the aircraft for parts reclamation to satisfy DoD supply system needs with the needs of the owning Military Service taking precedence.
4. Transfer excess aircraft to a Federal civil agency through GSA.
5. Donation surplus aircraft to authorized recipients through GSA.

The DRMS has the primary role in selling aircraft, including selecting the most appropriate sales method, catalog layout, and advertising. Much of this is left up to the local

DRMOs, which specialize in a particular product; DRMO Tucson specializes in aircraft/parts. The DRMO may not offer, obligate, transfer, or donate any aircraft without written direction from the owning Military Service. After receiving the transfer documents from the owning Military Service, the DRMO requests the FAA to inspect aircraft that have potential for airworthiness certification. In Table 2.2, this pertains to Category B and E aircraft. For Category E aircraft, DRMO requests an FAA inspection, but the FAA cannot perform a screening inspection since a FAA Type Certificate has not been issued for the particular model. Instead, the FAA renders a written opinion as to whether or not the aircraft has reasonable potential for Standard Certification. The purchaser is responsible for obtaining an FAA Type Certificate before this aircraft is eligible for airworthiness certification. There is no prohibition that prevents a purchaser from building or rebuilding a commercial type aircraft sold for the recovery of parts. FAA Advisory Circular AC 21-13 [Ref. 7] states,

> The Department of Defense (DOD) disposes of military aircraft which, when shown to meet FAA design requirements, may be eligible for an Airworthiness Certificate. In addition, the DOD sells major components and spare parts which the purchaser may use to build a complete aircraft. In order that these parts can be used for certification they must have been manufactured and inspected in accordance with FAA requirements. These aircraft and aircraft assembled from the spare parts must meet FAA design requirements and airworthiness standards before a Standard Airworthiness Certificate can be issued for the aircraft.
>
> ... The Defense Disposal Manual (DOD 4160.21M) states that the DOD does not assume any liability or in any way represent the aircraft as meeting, or being capable of meeting, the Federal Aviation Administration Standard Airworthiness Certification requirements. The person who purchases these aircraft must demonstrate that the aircraft conforms to the FAA Type Certificate and is in a condition for safe operations.

There are two primary methods of selling surplus property: sealed bid and national auction.

1. Sealed bid - this technique is used to sell large quantities of property to buyers on a regional or international marketing basis. Bids are opened on a specified date. Subsequently, awards are made and bidders notified.
2. National auction - this technique is used to sell a substantial quantity or variety of property having wide commercial application, usually at one location.

Category A	Fixed wing aircraft which have not been designed or modified to a combat configuration
Category B	Commercial type aircraft which have an existing FAA civil type certificate
Category C	Aircraft used for ground instructional aircraft
Category D	Aircraft that are combat configured
Category E	Aircraft having no commercial application by virtue of no existing FAA civil type certificate for the model, but have been identified as commercially saleable.

Table 2.2. DRMO Categories of Aircraft for Disposal From Ref. [6]

To enhance the sales value of surplus aircraft/parts, property should be lotted and displayed in a manner that will maximize proceeds at the minimum expense to the U. S. Government. The NSO automatically mails sales catalogs to a Bidders List. The sales catalog describes the property, sales location, property location, inspection and sales dates, and a contact for further information. Catalogs are mailed in advance of the date of sale to

allow sufficient time for inspection. A list of successful bidders, prepared after each sealed bid sale, shows prices for items awarded. This list is sent to each bidder who participated in the sale. Also, advertisement are published in the Commerce Business Daily (notice of scheduled DOD International sales), trade publications, periodicals, newspapers, and the World Wide Web (http://www.drms.dla.mil). Advertising increases the exposure to the general public and specific interest groups. Using the World Wide Web alone has dramatically increased visabilty, with over 30,000 unique hosts accessing more than 500,000 pages of data since the DRMS web page was developed. Digital images of special property are also available. DRMS has developed the largest searchable on-line database for government products available for sale/reuse. Examples of the electronic advertizing is available in Appendix B.

The DRMO must carefully consider the adverse market impact which may result through the untimely sale of large quantities of certain surplus items. An example is the upcoming sale of over 1,000 Air National Guard UH-1 helicopters. Market analysis was performed to determine the market saturation point. By determining the saturation point, DRMO developed a marketing strategy which limits the number of helicopters placed on the market. This increases DoD's rate of return.

E. MISCELLANEOUS ISSUES

1. Accounting

As previously mentioned, AMARC operates with a break-even philosophy - zero loss, zero gain. All costs for the upcoming year are projected. Direct labor and direct materials are estimated using workload forecasts as provided by the individual services. Indirect costs

and overhead is then allocated based on Direct Labor Hours (DLH). The result is an unadjusted standard rate. This rate is then adjusted to compensate for previous losses/gains, respectively. The result is an hourly rate, different for each type process, which should balance revenues and expenses at year end.

A typical DBOF 'revolving fund' process is illustrated in Figure 2.3. The customer places an order for services (step 1.), the DBOF activity then finances the work using the revolving fund (step 2.). Work is initiated/completed (step3) and the customer is billed at the standard rate (step 4.). The customer then reimburses the revolving fund (step 5.).

All services rendered by AMARC are reimbursable. Billings are prepared monthly. Upon receipt of the principals's workload, AMARC estimates the number of direct labor hours (DLH) to accomplish the workload. A cost projection is provided to the principal within 20 work days. Work does not begin before receiving the project order or letter of intent. This provides the funding authority and authorization to perform the work. AMARC monitors fund execution and advises the principal before using over 80% of the alotted funds.

Cost of services are accumulated in AMARC's cost/billing system. DLHs by specific aircraft are accumulated in monthly production summaries (I20 report). Military pay and benefits, and inventory located at AMARC but owned by the principal are not included in the costs. The principals are responsible for obtaining reimbursements for FMS projects. All costs associated with transfers or donations are charged to the recipient of the property; non-DoD customers are charged at actual cost.

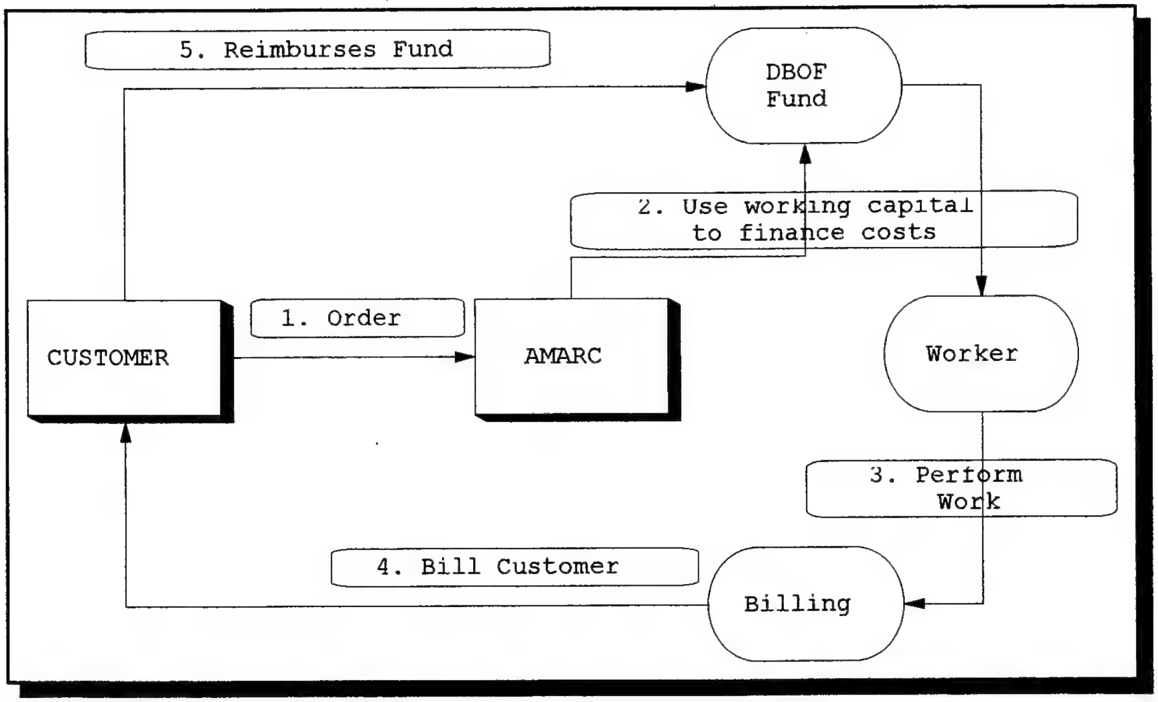

Figure 2.3. DBOF Revolving Fund Cycle

2. Foreign Military Sales (FMS)

In 1991, FMS accounted for two percent of the "flyaway" aircraft. In 1994 and 1995 FMS accounted for approximately half of the process-out workload. This trend is expected to continue over the next few years. Aircraft having this potential are retained by AMARC as whole aircraft, unless otherwise directed by the principal. The principal arranges with AMARC for FMS country representatives to inspect and select aircraft for withdrawal. The principle and the third party negotiate for transfer/loan of aircraft. FMS sales are on an actual cost accrual costing method vice the standard rate method used for domestic military customers. It is the principal's responsibility to have the aircraft recipient cite funds to AMARC for services desired.

3. Legislation

Assets stored at AMARC are subject to legislation, covering domestic and international policies. The on-going process of destroying over 350 B-52's is being directed by the Strategic Arms Reduction Treaty (START). Prior to that, the Intermediate-Range Nuclear Forces Treaty (INF) directed the destruction of 443 Ground Launched Cruise Missiles (GLCM).

On the domestic front, the FAA limits and restricts aircraft and aircraft parts sales [Ref. 7]. All aircraft used in U. S. Civil operations are legally required to be certificated in accordance with the Federal Aviation Act of 1958 and the implementing Federal Aviation Regulations.

The National Historic Preservation Act, although never enforced with regard to excess aircraft at AMARC, has potential for controversy, The act states that anyone can:

> ... nominate to the Secretary of Interior all buildings, sites, districts, structures, and objects under their jurisdiction and control that appear to qualify for listing on the National Register of Historic Places. [Ref. 8]

The National Register is a guide to the nation's cultural resources and indicates property that should be protected from destruction or impairment. DoD has stated that the act would apply to aircraft only in the most unusual circumstances. As a general rule "... a property under 50 years old is eligible for the National Register only if it is of exceptional importance ...." [Ref. 8].

> The National Historic Preservation Act permits the Department of Defense to nominate aircraft with historic significance for listing on the National Register of Historic Places, ... neither DoD, nor anyone else, has nominated any DoD aircraft for the National Register. [Ref. 8]

F. MISCELLANEOUS ORGANIZATIONS

Various organizations use AMARC facilities for a wide range of purposes. Germany has an aircraft stored at the Center; 28 Pakistani F-16s, each with less than seven flight hours on their logs, are also being stored due to diplomatic reasons concerning nuclear weapons treaties.

Many museum have aircraft at the Center, most awaiting transportation. The National Air and Space Museum (NASM) has six aircraft stored at AMARC. It also has a Boeing 707 fuselage and a Convair C-131E at AMARC as RIT stock for existing display aircraft.

The FAA has used some retired aircraft as test beds for research, such as explosive testing to simulate terrorist attacks. With knowledge obtained in this research, safer aircrafts can be designed.

The Center also provides unique training environment for various organizations and schools, including: aircraft battle damage repair school, Crash-recovery teams practicing aircraft retrieval with heavy-lift helicopters, and DoD, FBI, ATF, and Federal Law Enforcement training for such situations as hostage recovery.

III. PERTINENT DATA

This chapter presents data in three separate sections: Unit Standard Price, Navy data, and DRMO data. The data will be evaluated and analyzed in Chapter IV, recommendations and conclusions presented in Chapter V.

A. UNIT STANDARD PRICE (USP)

AMARC has used standard pricing since 1987 when they transitioned from an O&M facility to an Industrial Fund activity. AMARC rates are initially developed for a fiscal year in conjunction with the budget estimates for that year. They are stabilized for two years, and may be changed only to reflect changes in budget guidance or to adjust for prior period profit/losses to achieve a long-range break-even position.

The customer's cost per work request is determined by multiplying the sales rate per hour times the negotiated manhours. The principal identifies the requirement and AMARC provides the specifications. AMARC provides the manhour planning estimates quarterly for projected workloads. AMARC is responsible for all workloads on aircraft and equipment stored there. If they are unable to do the work, the requesting service can negotiate with AMARC to have an organic (DOD) field team complete the work.

The customer is unable to shop around for the best price for work to be done on their aircraft at AMARC. The price quoted is either accepted, rejected, or the specifications are changed to reduce the estimated price. If rejected, the desired work is suspended until money is available or prices are

reduced. In the stated cost equation:

work order cost = actual manhours X USP

the crucial variable has been the Unit Standard Price (USP). A predictable annual USP allows the customer to accurately project budget requirements and schedule workloads.

In Table 3.1, USP data is presented for 10 years, FY 87 through FY 96. The data represents a uniform cost trend for all but one process cost (Withdrawal - Air the exception from FY 93 to present). From FY 87 through FY 91 the rates were relatively stable. The FY 92 rates increased an average of 18.63%. FY-93 rate changes varied from process to process, with five of the seven rates showing a slight to moderate decline. FY 94 rates changed dramatically from the previous year. Six of the seven rates declined an average of 30.8%. The greatest decline was a 43.8% reduction in the Process-In rate, with only Withdrawal - Air registering an increase, 1.01%. Both FY 95 and FY 96 rates reflected significant increases in all seven processes. These rate fluctuations are graphically presented in Figure 3.1.

Figure 3.2 is a breakdown of the cost allocations which make up the USPs for FY 92 through FY 96. The direct costs include : direct labor, direct material, and direct other. Production overhead and general and administrative overhead are indirect costs allocated on the basis of direct labor hours (DLH). Carryover adjustment is the monetary adjustment applied to the USP of each process to compensate for a previous year's profit or loss. This factor is applied to satisfy the long term goal of zero profit. With the exception of FY 95, the carryover adjustment is applied across the board vice by process.

Figure 3.3 looks at the three primary cost drivers of the resource allocation: direct labor, production overhead, and G&A overhead for FY 94 through FY 96.

USP By Process	FY-87	FY-88	FY-89	FY-90	FY-91	FY-92	FY-93	FY-94	FY-95	FY-96
Withdrawal-Air	$55.66	$54.08	$53.48	$56.19	$55.47	$61.85	$75.64	$76.49	$84.01	$103.44
Withdrawal-Surface	$52.54	$53.66	$52.37	$48.90	$48.78	$56.57	$50.14	$37.91	$54.28	$68.69
Process-In Storage	$46.68	$48.33	$47.82	$49.31	$47.81	$57.34	$60.86	$34.20	$52.69	$63.49
Maintain in Storage	$49.52	$49.66	$47.46	$49.03	$48.92	$61.56	$55.13	$38.67	$58.74	$69.30
Representation	$47.31	$46.24	$44.76	$50.20	$47.41	$57.29	$55.60	$35.44	$53.60	$66.96
Reclamation	$51.87	$52.99	$57.71	$49.14	$47.19	$55.83	$48.31	$33.61	$52.14	$61.93
Miscellaneous	$48.45	$48.66	$47.84	$48.61	$48.04	$56.75	$49.74	$39.85	$54.73	$68.49

Table 3.1. AMARC Unit Standard Price by Process - FY 87 - 95.

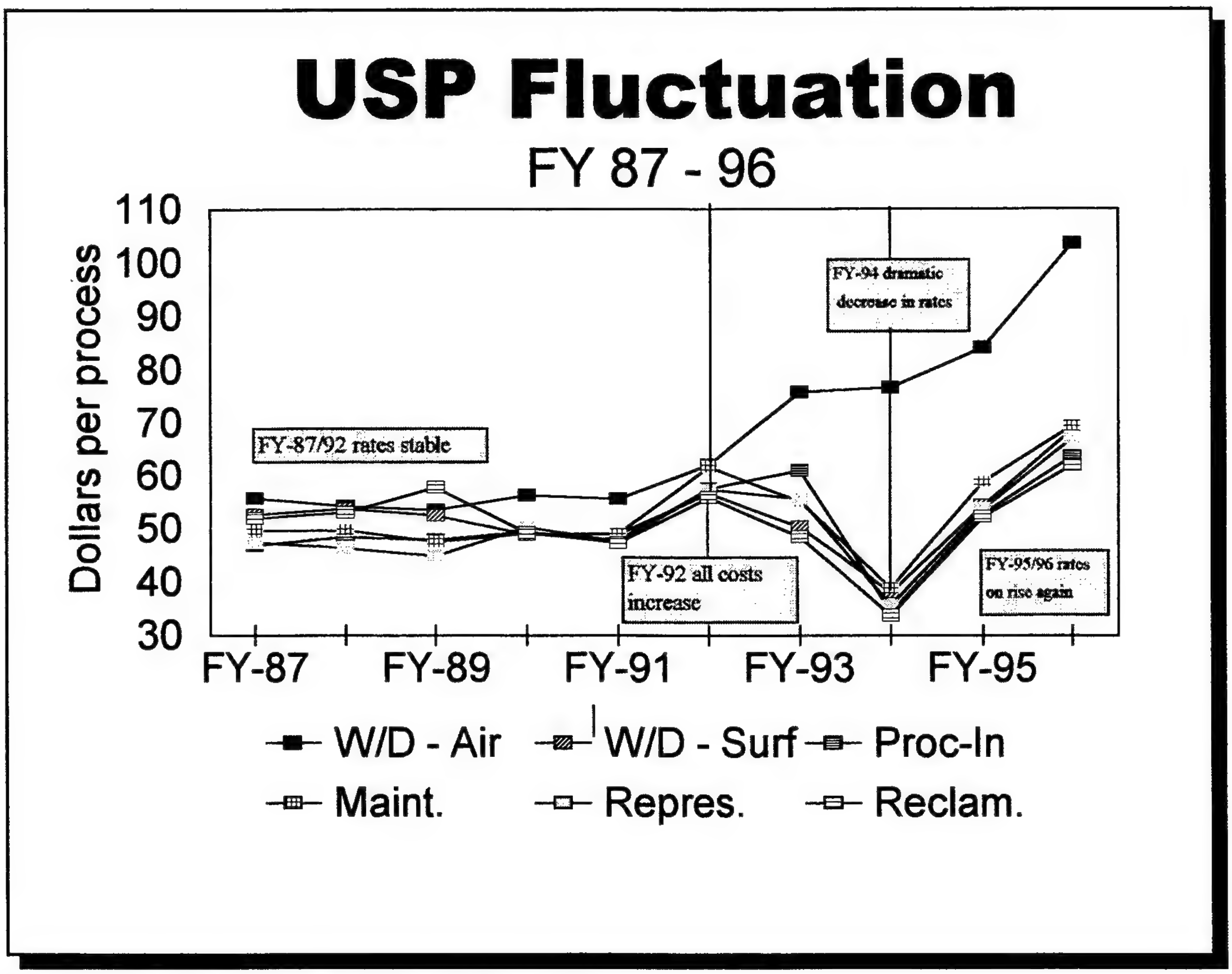

Figure 3.1. USP Rate Fluctuation FY 87 - 96

FY-92 Process	Direct Labor	Direct Material	Direct Other	Product. O/H	G&A O/H	**Carryover Adjustment**	Total
W/D Air	19.84	8.41	0.07	20.11	11.68	1.74	$61.85
W/D O/L	19.48	0.00	0.00	21.28	14.07	1.74	$56.57
Proc-In	19.48	0.00	0.00	22.97	13.15	1.74	$57.34
Maint. In	18.39	0.00	0.00	28.65	12.78	1.74	$61.56
Repres	18.96	0.00	0.00	23.31	13.28	1.74	$57.29
Reclamation	18.78	0.00	0.00	21.49	13.82	1.74	$55.83
Miscellaneous	18.40	0.41	0.00	23.31	12.89	1.74	$56.75

FY-93 Process	Direct Labor	Direct Material	Direct Other	Product. O/H	G&A O/H	**Carryover Adjustment**	Total
W/D Air	21.72	25.37	0.07	16.71	9.23	2.54	$75.64
W/D O/L	20.36	0.00	0.00	16.88	10.36	2.54	$50.14
Proc-In	20.12	0.74	0.00	18.24	9.22	2.54	$50.86
Maint. In	19.28	0.00	0.00	24.24	9.07	2.54	$55.13
Repres	19.84	4.79	0.00	18.90	9.53	2.54	$55.60
Reclamation	19.66	0.00	0.00	17.00	9.11	2.54	$48.31
Miscellaneous	19.04	0.54	0.00	18.67	8.97	2.54	$49.74

FY-94 Process	Direct Labor	Direct Material	Direct Other	Product. O/H	G&A O/H	**Carryover Adjustment**	Total
W/D Air	21.48	40.00	0.29	21.09	10.43	(16.80)	$76.49
W/D O/L	19.04	0.00	0.00	23.29	12.38	(16.80)	$37.91
Proc-In	19.16	0.00	0.00	21.38	10.46	(16.80)	$34.20
Maint. In	16.93	0.00	0.00	28.73	9.81	(16.80)	$38.67
Repres	19.06	0.00	0.00	24.07	9.11	(16.80)	$35.44
Reclamation	19.33	0.00	0.00	20.77	10.31	(16.80)	$33.61
Miscellaneous	19.76	1.54	0.17	24.81	10.37	(16.80)	$39.85

FY-95 Process	Direct Labor	Direct Material	Direct Other	Product. O/H	G&A O/H	**Carryover Adjustment**	Total
W/D Air	23.25	29.57	0.66	19.69	10.37	0.50	$84.01
W/D O/L	20.58	0.00	0.00	21.58	12.10	0.02	$54.28
Proc-In	20.72	0.00	0.00	20.03	10.41	1.53	$52.69
Maint. In	18.31	0.00	0.00	26.67	9.63	4.13	$58.74
Repres	20.60	0.00	0.00	22.45	9.07	1.48	$53.60
Reclamation	20.90	0.00	0.00	19.72	10.49	1.04	$52.14
Miscellaneous	21.37	1.51	0.38	23.18	10.29	(2.00)	$54.73

FY-96 Process	Direct Labor	Direct Material	Direct Other	Product. O/H	G&A O/H	**Carryover Adjustment**	Total
W/D Air	23.55	41.21	0.11	22.52	11.87	4.18	$103.44
W/D O/L	21.77	0.00	0.00	30.71	12.03	4.18	$ 68.69
Proc-In	22.36	0.00	0.00	24.97	11.98	4.18	$ 63.49
Maint. In	20.76	0.00	0.00	32.50	11.86	4.18	$ 69.30
Repres	21.22	3.50	0.00	26.63	11.43	4.18	$ 66.96
Reclamation	21.63	0.00	0.00	24.19	11.93	4.18	$ 61.93
Miscellaneous	21.37	4.38	0.00	26.07	11.89	4.18	$ 68.49

Figure 3.2. FY 92 - 96 USP Costs Allocation

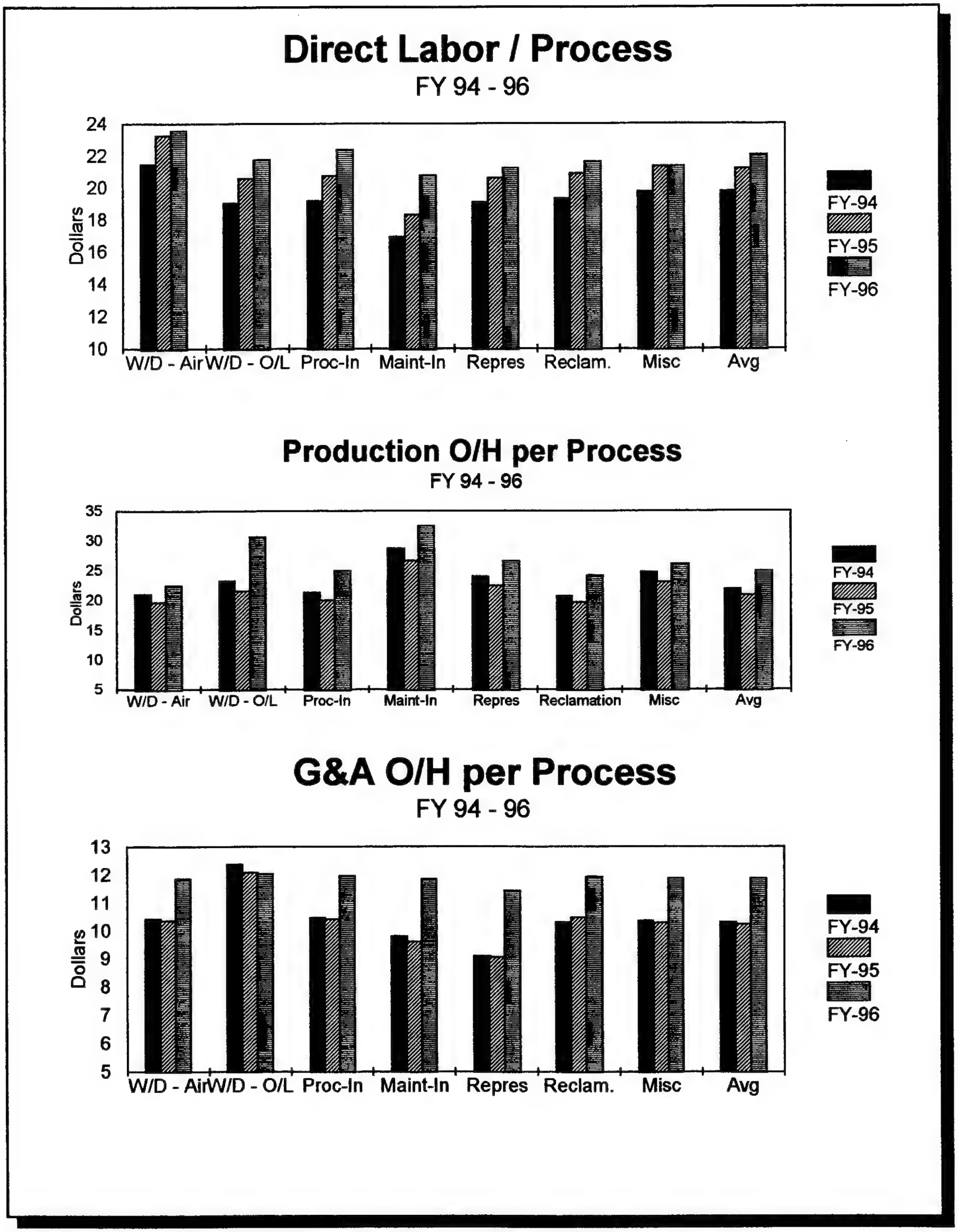

Figure 3.3. Major Resource Allocation Costs per Process - FY 94 - 96

Figure 3.4 is a graphical comparison of the rates with and without the carryover adjustments to illustrate its impact on the overall standard rate.

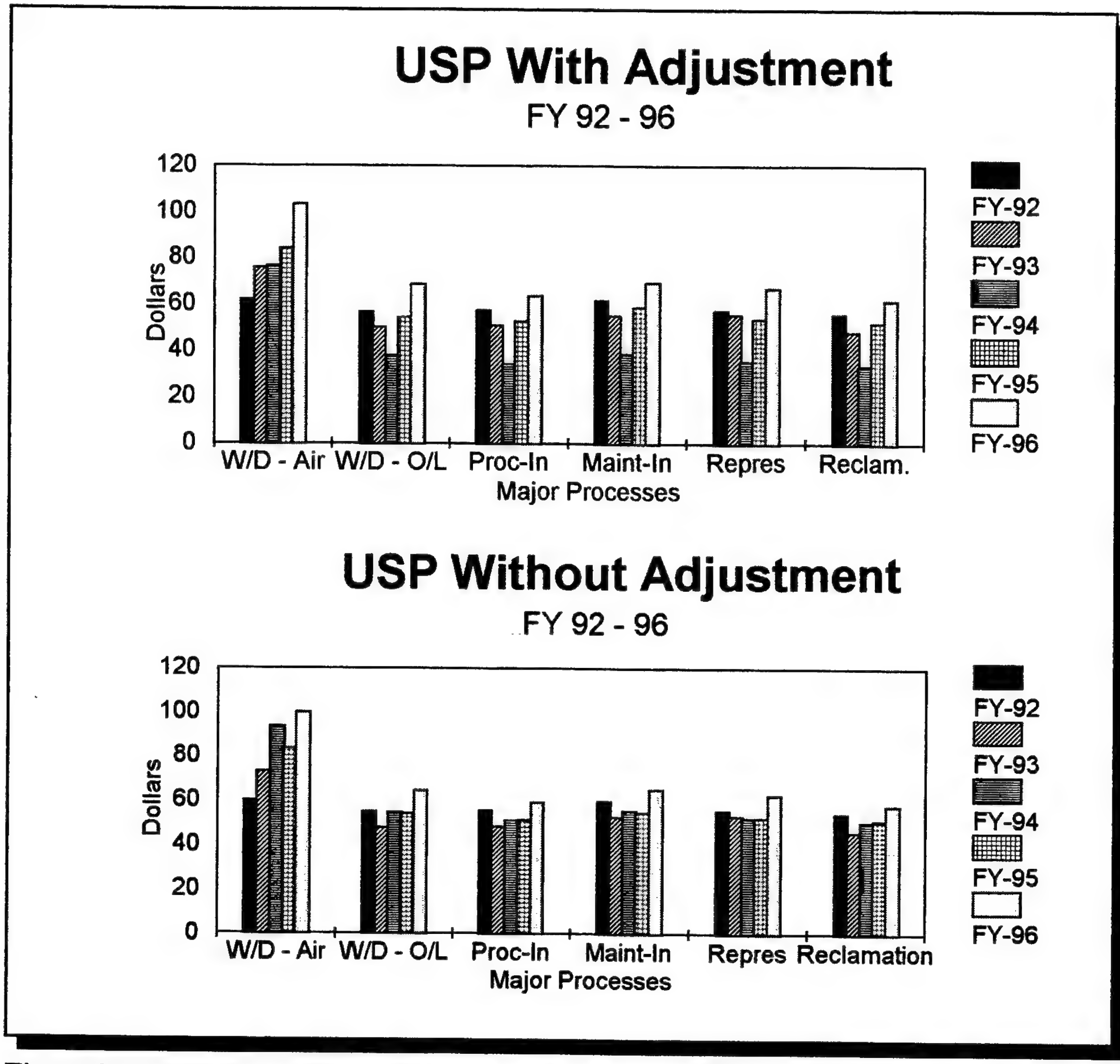

Figure 3.4. USP Rates With & Without Adjustment - FY 92 - 96

Meticulous job order costing information is maintained by individual aircraft. Figure 3.5 compares the FY 95 Unit Standard Price with the actual costs incurred by process. FY 96 USPs are presented for comparison purposes, however, the rate adjustment process lags the USP rates by two years. FY 95 actual costs will be reflected in the FY 97 rates yet to be determined.

Process-In	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$20.72	$0.00	$0.00	$20.03	$10.41	$51.16
FY-95Avg Costs	$21.95	$0.16	$0.00	$27.27	$11.19	$60.66
FY-96 USP	**$22.36**	**$0.00**	**$0.00**	**$24.97**	**$11.98**	**$59.31**

Reclamation	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$20.90	$0.00	$0.00	$19.72	$10.49	$51.10
FY-95 Avg Costs	$21.20	$0.00	$0.00	$27.95	$10.80	$59.95
FY-96 USP	**$21.63**	**$0.00**	**$0.00**	**$24.19**	**$11.93**	**$57.75**

Maintain-In	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$18.31	$0.00	$0.00	$26.67	$9.63	$54.61
FY-95 Avg Costs	$20.15	$0.14	$0.84	$33.60	$10.90	$65.63
FY-96 USP	**$20.76**	**$0.00**	**$0.00**	**$32.50**	**$11.86**	**$65.12**

Represervation	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$20.60	$0.00	$0.00	$22.45	$9.07	$52.12
FY-95 Avg Costs	$21.75	($0.01)	$0.00	$27.37	$10.97	$60.08
FY-96 USP	**$21.22**	**$3.50**	**$0.00**	**$26.63**	**$11.43**	**$62.78**

W/D - Air	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$23.25	$29.57	$0.66	$19.69	$10.37	$83.51
FY-95 Avg Costs	$23.79	$4.55	$9.80	$27.95	$11.20	$77.29
FY-96 USP	**$23.55**	**$41.21**	**$0.11**	**$22.52**	**$11.87**	**$99.26**

W/D - Surface	Direct Labor	Direct Material	Direct Other	Production Overhead	G&A Overhead	Total (no adjustment)
FY-95 USP	$20.58	$0.00	$0.00	$21.58	$12.10	$54.26
FY-95 Avg Costs	$21.40	$0.00	$0.00	$31.33	$10.25	$62.98
FY-96 USP	**$21.77**	**$0.00**	**$0.00**	**$30.71**	**$12.03**	**$64.51**

Figure 3.5. FY 95 Actual Average Costs per Hour

B. NAVY DATA

By the end of CY 95, the Navy had a total of 1,733 aircraft at AMARC (includes seven aircraft not accounted for by AMARC due to donation status) compared to 3,098 for the USAF. The value of the Navy aircraft totaled $9,866,479,638. The distribution of the Navy aircraft, by section, is as follows:

Section 1 - 358	Inviolate
Section 2 - 173	Special Projects (Stricken)
Section 3 - 483	FMS/SAP (Stricken)
Section 4 - 47	Museum / Donation
Section 5 - 672	Reclamation (Stricken)

The breakdown of aircraft and aircraft value by customer is summarized in Table 3.2. Note that the Navy has 1,054 aircraft in storage (section 1 through 4) constituting 61.07% of the total Navy aircraft and only 65.35% of the total Navy aircraft value; the USAF has 2,356 aircraft in storage constituting 74.37% of the total USAF aircraft and 79.14% of total USAF aircraft value.

Aircraft are accounted for at their average acquisition value, meaning the average historical cost to the government, not adjusted to present day dollars or to the individual negative inventory lists. Replacement value is used to value aircraft when sold in the FMS/SAP program. This value is determined by the present unit cost for aircraft still in production, or the last unit cost adjusted to current fiscal year dollars. Table 3.3 compares average acquisition value to replacement value [Ref. 9].

	Storage		Reclamation		DRMO/DLA	
	Qty	Value	Qty	Value	Qty	Value
Air Force	2356	$ 10,895,403,413	812	$ 2,871,560,379	1	$ 2,830,000
Navy	1054	$ 6,447,999,488	672	$ 3,418,480,150		
Army	194	$ 194,966,712	41	$ 40,355,008		
USCG	14	$ 68,600,000	1	$ 245,000		
Non-DoD	38	$ 196,981,657				
FMS	2	$ 24,000,000				
Total	3658	$ 17,827,951,270	1526	$ 6,330,640,537	1	$ 2,830,000

Table 3.2. AMARC Aircraft and Aircraft Value by Customer

As mentioned earlier in this chapter, DoD customers pay a negotiated fee for work based on the formula: work order cost = actual manhours X USP. The actual total costs AMARC incurs for Navy work in FY 95 (includes reimbursable actual cost for FMS) are as follows:

Process-In	$2,003,840.75
Flyaway	$1,156,885.41
Maintain-In	$ 197,748.12
Repres.	$ 205,089.60
Surface W/D	$ 706,113.35
Prog. Reclam.	$ 241,437.12
Total	$4,511,114.35

Aircraft Model	Avg. Acquisition Cost (Table I)	Replacement Value in FY-94 dollars (Table II)	Percent Increase from Actual to Replacement Value
F-14A	$ 19,947,000	$ 43,350,000	117.33%
F-4S	$ 3,070,000	$ 15,850,000	416.29%
EA-3B	$ 3,798,000	$ 25,825,000	579.96%
A-4E	$ 766,000	$ 4,915,000	541.64%
A-4M	$ 2,122,000	$ 7,928,000	273.61%
A-6E	$ 17,360,000	$ 34,040,000	96.08%
AV-8B	$ 18,222,000	$ 28,218,000	54.86%
S-3A	$ 12,395,000	$ 36,391,000	193.59%
P-3A	$ 4,159,000	$ 23,208,000	458.02%
C-2A	$ 14,439,000	$ 23,399,000	62.05%
C-130T	$ 25,351,000	$ 27,791,000	9.62%
T-2C	$ 751,000	$ 3,382,000	350.33%
T-34C	$ 536,000	$ 1,282,000	139.18%
TA-4J	$ 1,298,000	$ 5,616,000	332.67%
UH-1N	$ 1,300,000	$ 3,381,000	160.08%
SH-2F	$ 5,718,000	$ 9,619,000	68.22%
SH-3G	$ 1,361,000	$ 4,622,000	239.60%
CH-46D	$ 1,697,000	$ 7,093,000	317.97%
SH-60B	$ 15,247,000	$ 20,743,000	36.05%

Table 3.3. Avg. Aircraft Acquisition Value to Replacement Value After Ref. [9]

The FSO receives an O&M budget to accomplish all work on excess Navy aircraft located at AMARC.

CNO (N880G) is responsible for providing optimum inventory levels, identifying the aircraft storage categories, and providing strike recommendations to the Director Air Warfare Division (N88). Figure 3.6 lists the Strike Board recommendations relating to aircraft located at the Center. The financial impact of these recommendations reflect the funds that are required to maintain these aircraft, especially represervation costs. A example of this correlation is the recommendation to transfer 26 F-4S aircraft from Section 1 to Section 5. All the F-4S aircraft in Section 1 have a represervation code of 10 (highest represervation state requiring full represervation every four years), transfer to Section 5 (no represervation requirement) generates an immediate savings of $313,898.

The Strike Board also formulates and/or revises the 2/7 year workload projections. These projections as used by AMARC to schedule their work and are used in their calculations for Unit Standard Prices. According to AMARC Workloaders, the only accurate projections are the two month updated projections provided on a monthly basis.

Figure 3.7 and 3.8 represent the 2 year and 7 year Process-In projection.

SECTION ONE

- 16 TA-4J aircraft to Section 5
- C-130F to section 3 for FMS
- NKC-135A to section 2 for special projects
- 26 F-4S to section 5
- UP-3B to section 3 for FMS

SECTION TWO

- all TA-4J to section 5
- TC-4C to section 2 for GSA or Museums
- P-3B to section 3 for FMS

SECTION THREE

- S-2G to section 5 if no FMS contract
- CT-39G to section 5
- Navy ICP to review requirements for 483 holdings in section 3

SECTION FOUR

- Museums schedule and fund aircraft withdrawals with AMARC

Figure 3.6. Recommended Changes from January 96 Strike Board From Ref. [10]

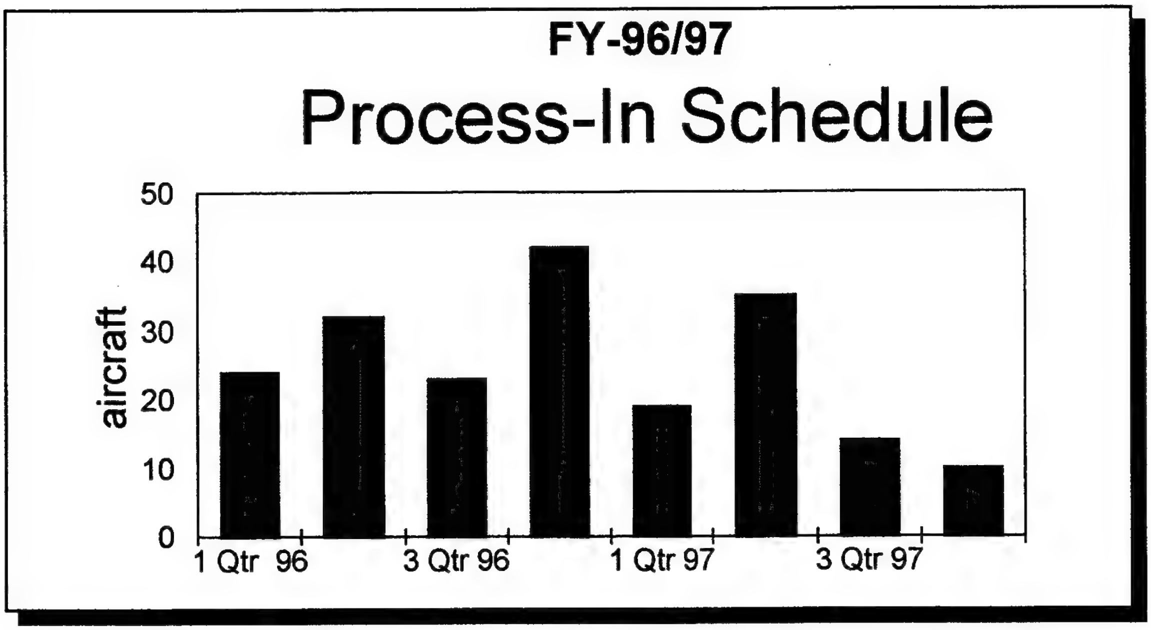

Figure 3.7. Number of Projected Process-In Aircraft for FY 96 & 97 - Navy

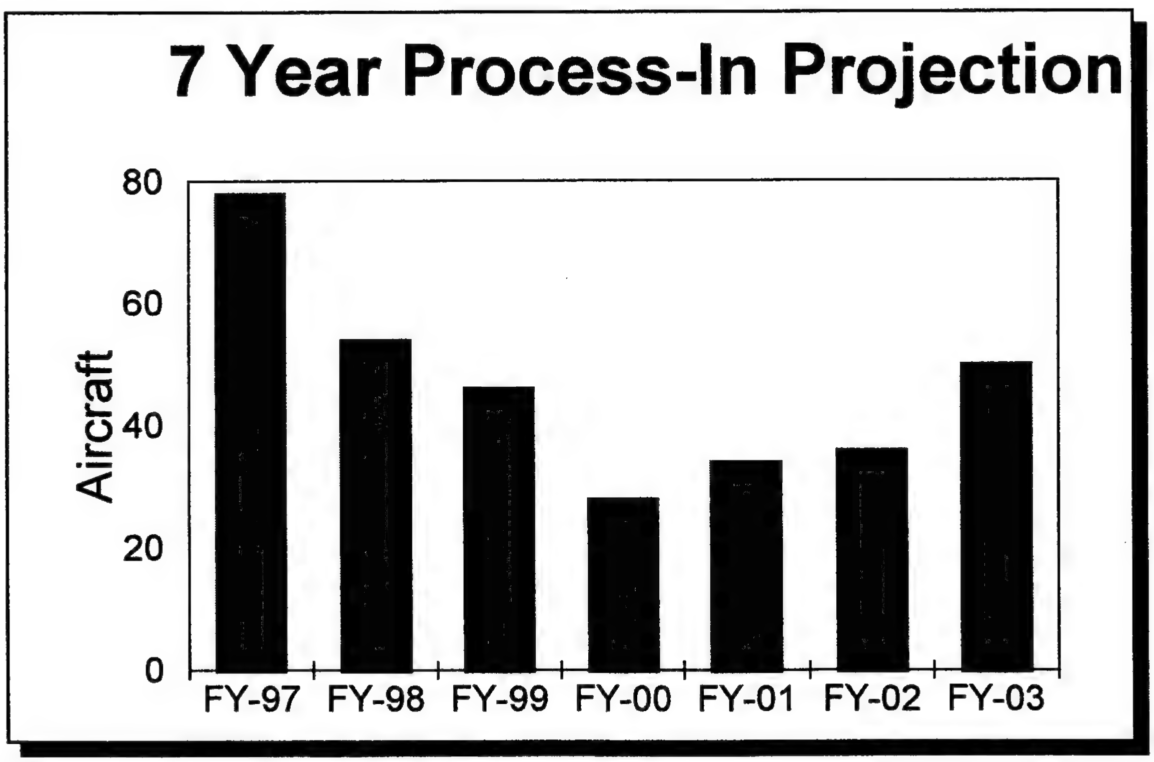

Figure 3.8. FY 97 through FY 03 Process-In Projections - Navy

Table 3.4 breaks down all aircraft scheduled for Process-In for FY 96. The costs shown are for 1000 Type preservation, i.e., full preservation for long-term storage. The figure illustrates several cost estimates including: the estimated cost if all aircraft are processed with full preservation, and the costs using FY 94 and FY 95 rates.

Aircraft	1 Qtr actual	2 Qtr	3 Qtr	4 Qtr	FY-96 Total	FY - 96 actual	FY - 95 USP rates	FY - 94 USP rates
TA-4J	2	0	0	6	8	$ 133,992.00	$ 111,200.00	$ 72,181.00
A-6E	10	6	5	31	52	$ 816,452.00	$ 677,574.00	$ 439,823.00
TA-7C	0	2	0	0	2	$ 21,802.00	$ 18,093.00	$ 11,745.00
C-28A	0	2	0	0	2	$ 25,396.00	$ 21,076.00	$ 13,681.00
NKC-135	0	0	1	0	1	$ 16,749.00	$ 13,900.00	$ 9,023.00
F-14A	0	4	0	1	5	$ 95,170.00	$ 78,982.00	$ 51,268.00
F/A-18A	6	14	13	0	33	$ 488,169.00	$ 405,131.00	$ 262,977.00
SH-3H	0	1	0	0	1	$ 10,120.00	$ 8,399.00	$ 5,452.00
HH-1N	1	1	0	0	2	$ 20,444.00	$ 16,966.00	$ 11,013.00
UH-3H	1	0	0	0	1	$ 10,222.00	$ 8,483.00	$ 5,507.00
CH-53D	2	0	0	0	2	$ 43,998.00	$ 36,514.00	$ 23,702.00
RH-53D	0	0	1	2	3	$ 65,997.00	$ 54,771.00	$ 35,553.00
CH-53E	0	1	1	0	2	$ 43,998.00	$ 36,514.00	$ 23,702.00
P-3C	0	0	2	2	4	$ 79,488.00	$ 65,967.00	$ 42,820.00
UP-3B	1	0	0	0	1	$ 19,872.00	$ 16,492.00	$ 10,705.00
US-3A	1	1	0	0	2	$ 32,570.00	$ 27,030.00	$ 17,545.00
Total	24	32	23	42	121	$ 1,924,439.00	$ 1,597,092.00	$ 1,036,695.00

Table 3.4. FY 96 Projected Process-In Costs at FY 94 - 96 Rates.

Table 3.5 compares the three primary process-in preservation levels and their associated cost in FY 94, 95, and 96. Between FY 94 and the present, average costs increased 104.78%. There is also significant cost differential between full (1000) and partial preservation (4000). On the average, partial preservation is 60% of the cost of full preservation.

Figure 3.9 compares two different TMS aircraft's actual process-in costs in FY 95. All 19 aircraft arrived and were processed-in during FY 95. At the end of CY 95, nine of the aircraft were stored in Section 5 (Reclamation) and ten in Section 1 (Inviolate). The significant difference in the cost of the five Section 1 A-6s compared to the five A-6s in Section 5 suggests that the reclamation aircraft were identified prior to arrival. The insignificant differences between the F-14 aircraft suggests this was not the case for the F-14.

Figure 3.10 and Figure 3.11 are two year projections for programmed (scheduled) reclamation and representation. What is evident in these two graphs, as well as Figures 3.7 and 3.8, is the inconsistency of the workload from fiscal quarter to fiscal quarter.

Aircraft	Type Storage	FY-96	FY - 95	FY - 94	% Increase FY 94 - 96
A-6	1000	$ 15,701	$ 11,112	$ 5,896	166.30%
	2000	$ 11,644	$ 9,558	$ 5,011	132.67%
	4000	$ 9,155	$ 5,891	$ 3,940	132.36%
P-3	1000	$ 19,872	$ 16,676	$ 11,228	76.99%
	2000	$ 17,471	$ 13,910	$ 7,709	126.63%
	4000	$ 12,628	$ 10,480	$ 5,585	126.11%
F-14	1000	$ 19,034	$ 16,260	$ 10,554	80.35%
	2000	$ 18,571	$ 15,306	$ 9,935	86.93%
	4000	$ 13,136	$ 7,150	$ 4,641	183.04%
C-130	1000	$ 20,203	$ 16,276	$ 11,546	74.98%
	2000	$ 16,444	$ 15,222	$ 10,383	58.37%
	4000	$ 10,431	$ 8,657	$ 5,619	85.64%
S-3	1000	$ 16,285	$ 13,515	$ 8,772	85.65%
	2000	$ 13,854	$ 11,497	$ 7,462	85.66%
	4000	$ 12,628	$ 6,360	$ 4,128	205.91%
T-34	1000	$ 8,431	$ 6,997	$ 5,041	67.25%
	2000	$ 6,622	$ 5,390	$ 4,285	54.54%
	4000	$ 3,638	$ 2,914	$ 2,319	56.88%
H-2	1000	$ 15,638	$ 12,978	$ 8,246	89.64%
	2000	$ 14,241	$ 12,530	$ 6,796	109.55%
	4000	$ 9,111	$ 7,561	$ 4,569	99.41%
E-2	1000	$ 16,438	$ 13,641	$ 7,832	109.88%
	2000	$ 15,066	$ 12,503	$ 7,175	109.98%
	4000	$ 9,708	$ 8,056	$ 4,624	109.95%

Table 3.5. Process-In Costs by TMS and Preservation Level - FY 94 - 96

FY-95

Model	AMARC #	Arrival Date	Preservation Date	Total Actual Costs	Section
A-6E	AN5A0143	94343	95072	$16,911.57	1
A-6E	AN5A0154	95054	95115	$14,656.92	1
A-6E	AN5A0159	95187	95248	$14,507.59	1
A-6E	AN5A0158	95165	95234	$16,087.30	1
A-6E	AN5A0152	95039	95115	$15,552.73	1
			Average Cost	$15,543.22	
A-6E	AN5A0138	94291		$ 8,905.18	5
A-6E	AN5A0156	95086		$10,223.02	5
A-6E	AN5A0144	95013		$ 7,196.45	5
A-6E	AN5A0142	94343		$ 7,493.32	5
A-6E	AN5A0155	95074		$ 9,778.31	5
			Average Cost	$ 8,719.26	
F-14A	AN1K0076	95080	95156	$13,089.58	1
F-14A	AN1K0078	95116	95173	$16,368.84	1
F-14A	AN1K0079	95188	95248	$19,448.58	1
F-14A	AN1K0075	95075	95150	$23,813.78	1
F-14A	AN1K0077	95116	95177	$20,253.21	1
			Average Cost	$18,594.80	
F-14A	AN1K0072	94299		$19,869.87	5
F-14A	AN1K0073	94342		$15,900.60	5
F-14A	AN1K0074	95072		$12,473.81	5
F-14A	AN1K0071	94287		$18,962.72	5
			Average Cost	$16,801.75	

Figure 3.9. Actual Aircraft Process-In Costs - Section 1 vs Section 5

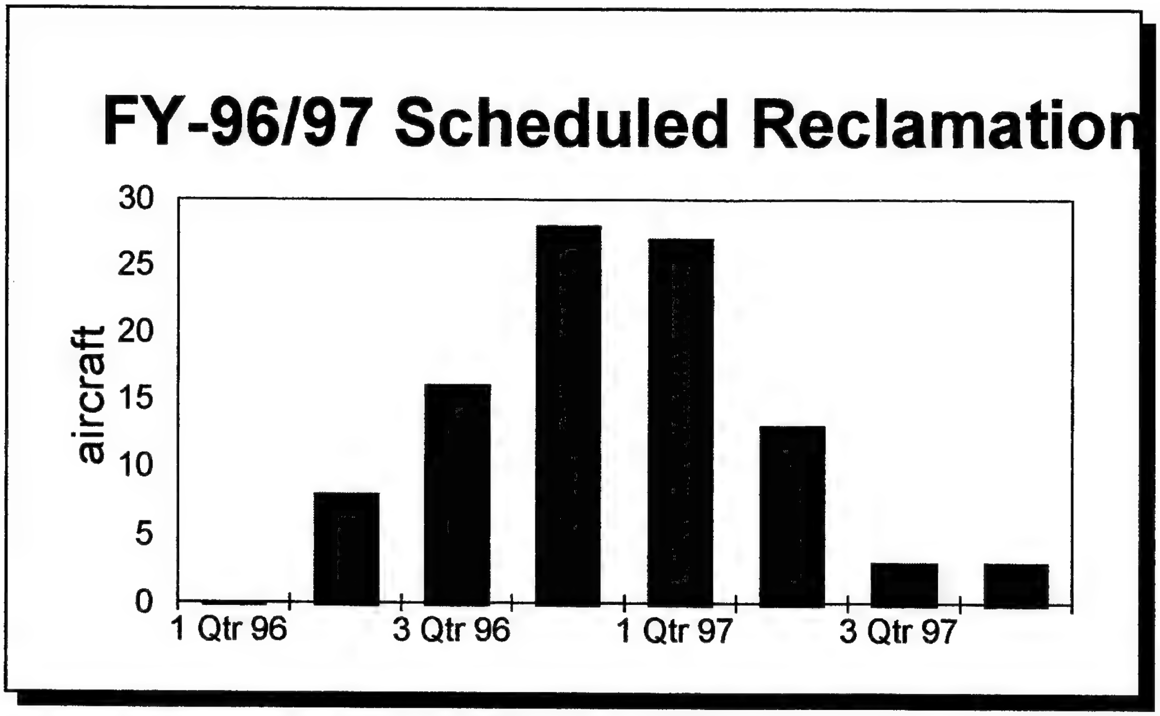

Figure 3.10. FY 96 & 97 Projected Programmed Reclamation - Navy

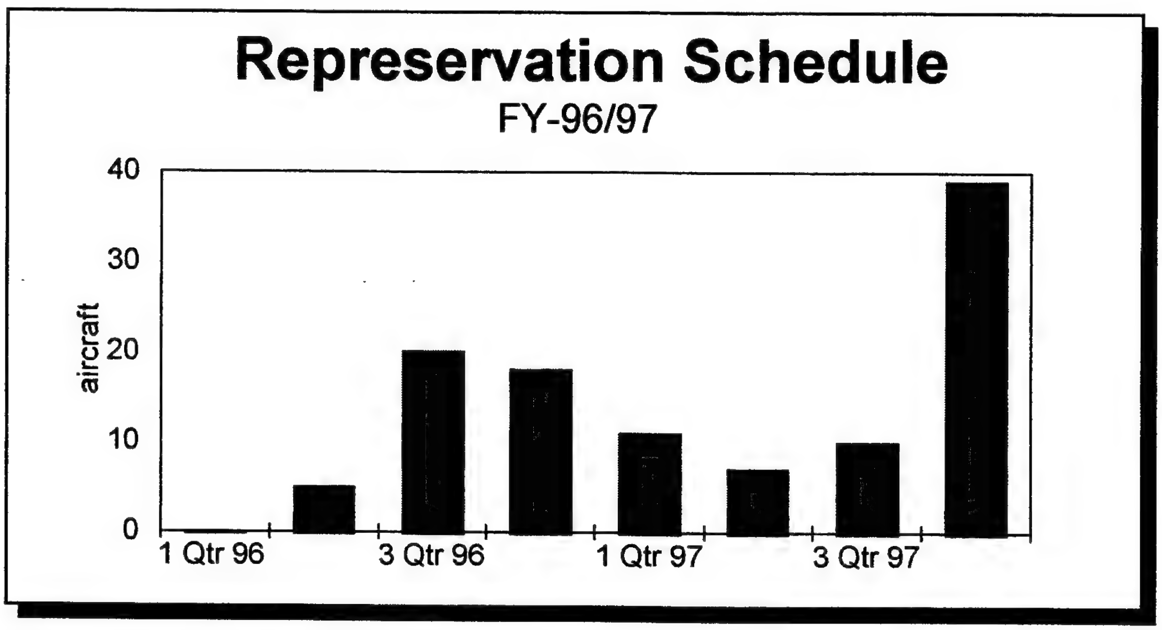

Figure 3.11. FY 96 & 97 Projected Representation - Navy

C. DRMO DATA

In fiscal year 1993, DoD sold about 15 million usable aircraft parts to the general public with an acquisition value of over $1.8 billion through its surplus sales program. DoD also sold over 45 million pounds of scrap aircraft parts to the general public--parts that are not intended for use and are sold for their metal content value. DoD's proceeds from the sale of both usable and scrap aircraft parts during fiscal year 1993 totaled about $23 million. DoD's rate of return from such parts--expressed as the ratio of sales proceeds to the part's acquisition cost--has been low, averaging less than 1 percent. This rate for aircraft parts is lower than the average 2-percent return DOD received for all of its surplus property.

In contrast, commercial airlines realize proceeds on the order of 40 to 50 percent (based on the price of the part brand new) from the sale of comparable parts. In a 1994 General Accounting Office (GAO) report, they state that the large difference in proceeds reflects the different incentives and marketing practices [Ref. 11].

Table 3.6 contains data for rates of return of aircraft parts lots from the Invitation For Bid 31-6325 and 31-6320. All lots were sold on-site by DRMO Tucson from excess aircraft located at AMARC. The lots were compiled of like aircraft parts to enhance sales. A short description of each part was included. The description included:

Descriptive name of part

Manufacturing Code

Manufacturer

Part Number

Demilitarization Code

National Stock Number (NSN)

Each lot had a description which included:

Point of Contact (POC)

Location of Parts

Whether parts were packed / unpacked

Condition of parts

Total Cost to Government

Estimated Weight

Lot #	Description	Original Cost	Sales Price	Rate of Return
4	Aircraft Components & Acc.- F-4	$ 10,981.99	$ 114.00	1.038%
5	Aircraft Components & Acc.- A-10	$ 71,527.46	$ 589.00	0.823%
6	Aircraft Components & Accessories	$ 20,563.25	$ 676.86	3.292%
1	Aircraft Components & Accessories	$ 198,784.98	$ 726.67	0.366%
2	Aircraft Components & Acc.- C-130	$ 834.76	$ 101.01	12.100%
3	Helicopter Components & Acc.- H-3	$ 8,477.28	$ 3,006.00	35.459%
4	Aircraft Components & Acc.- OV-10	$ 26,701.65	$ 880.00	3.296%
5	Helicopter Components & Acc.	$ 1,720.53	$ 301.00	17.495%
6	Aircraft A/C., Heat., Press. Equip	$ 15,094.48	$ 200.00	1.325%
7	Engine, Aircraft, Turbojet, J-75 (3)	$ 900,807.00	$ 81,375.00	9.034%

Table 3.6. Rate of Return for Aircraft Parts

Figure 3.12 is DRMO Tucson's FY 96 projected aircraft sales and estimated revenue.

Jet Engine Sales

Type	Avg Price	Qty	Total Proceeds
T-56	$10,000	1	$ 10,000
J-57	$ 2,500	250	$ 625,000
T-64	$ 4,000	2	$ 8,000
J-75	$27,000	5	$ 135,000
J-79	$ 6,000	300	$1,800,000

Recyclable Aircraft Sales

Type	Weight	Price/lb.	Qty	Est. Proceeds
B-52	115,000	$0.32	8	$ 294,000
F-4	15,000	$0.32	5	$ 24,000
A-7	7,500	$0.32	9	$ 21,600

Aircraft Sales

Type	Avg Price	Qty	Total Proceeds
C-130	$12,500	8	$ 100,000
C-135	$12,000	1	$ 12,000
C-137	$20,000	1	$ 20,000
		TOTAL	$3,050,000

Figure 3.12. DRMO FY-96 Projected Aircraft Sales

IV. EVALUATION AND ANALYSIS

Given the data presented in Chapter III and the extensive interviews conducted with key personnel involved in the process, there are several areas of aircraft disposition to investigate and analyze to optimize the return from excess aircraft. The primary areas include:

- Evaluation of Unit Standard Price
- Process-In preservation
- Aircraft storage
- Reclamation techniques
- Process-Out methods
- DRMO sales procedures

A. EVALUATION OF UNIT STANDARD PRICE

From FY 91 until the present, the USPs for all processes have been erratic. Why do the rates fluctuate from year to year in an organization that has been processing excess aircraft since 1946? The accuracy of the sales rate depends upon many variables, including:

- Detailed job order cost records.
- Accurate workload projections.
- Precise cost estimates.
- Previous year Net Operating Revenue (NOR).

The biggest variation occurs when comparing total USP to adjusted total USP (total costs + carryover adjustment). Table 4.1 compares USP data between FY 94 and FY 96. Process-In costs, which make up 44% of the Navy's AMARC expenses (Figure 4.1), increased 86% in just this two- year period. These rate fluctuations have made it difficult for FSO personnel to plan and efficiently execute their annual budget. FSO works within a fixed budget which is not adjusted for current year USP rates. Therefore, as rates increase the Navy can not afford all their scheduled workload.

This reduced workload further aggravates USP price adjustments for the next year; the actual workload is less than projected. When actual workloads are less than projected, all other variables held constant, a loss can result. This loss is particularly likely if fixed costs are high relative to variable operations costs, as is the case with AMARC. Fixed costs, which were allocated across the projected workload DLH, are not fully realized if the actual work load is less than projected. If fixed costs are significant, this shortfall out weighs any potential savings in per unit variable costs. The result is a further escalation of USP rates two years following, potentially reducing work load further and raising prices. This inverse relationship between USP rates and workload results in the phenomena commonly referred to as a "death spiral."

The mechanics of the adjustments are as follows: If the NOR for year two (base year) is other than zero, an adjustment must be made. The adjustment is calculated to ensure a long-term NOR of zero. This adjustment is applied to year three (base plus two) estimated cost per DLH. The overhead allocation is determined by two and seven year workload

Process	Direct Labor	Production Overhead	G&A Overhead	Adjusted Total	Unadjusted Total
W/D - Air	9.68%	6.78%	13.81%	35.23%	6.40%
W/D - Surface	14.34%	31.86%	-2.83%	81.19%	17.91%
Process-In	16.70%	16.79%	14.53%	85.64%	16.29%
Maintain-In	22.62%	13.12%	20.90%	79.21%	17.40%
Representation	11.33%	10.64%	25.47%	88.94%	20.18%
Reclamation	11.90%	16.47%	15.71%	84.26%	14.56%
Misc.	8.15%	5.08%	14.66%	70.36%	12.46%

Table 4.1. Cost Increase from FY 94 to FY 96

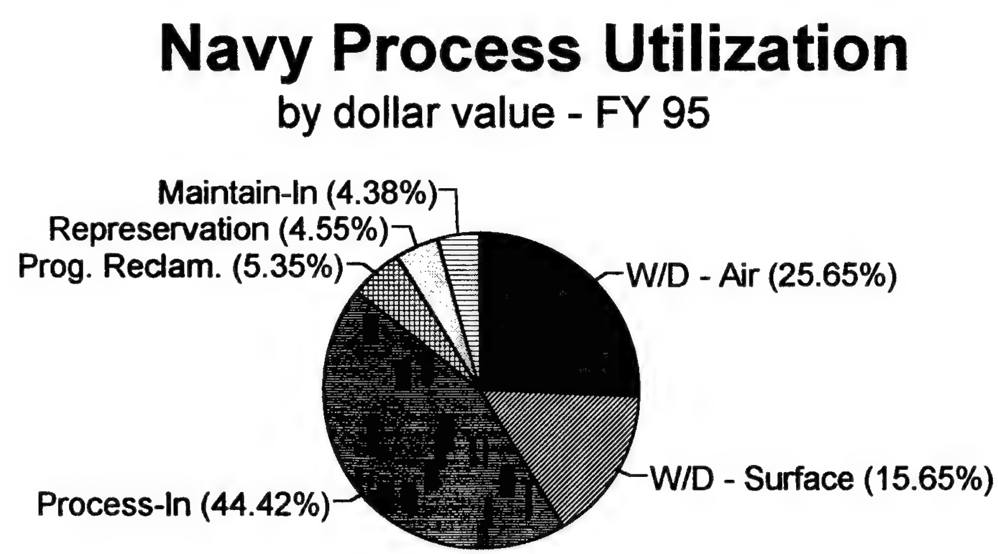

Figure 4.1. FY 95 Breakdown of Process Utilization - Navy

projections required by the Interservice Agreement (ISA) [Ref. 3]. The FSO is unable to make exact predictions on the actual workload to be accomplished until they receive their annual budget estimation, late in the prior fiscal year. In FY 94, the Navy submitted its FY 96 Process-In projections. As illustrated in Table 3.4, the cost for the actual FY 96 workload in FY 94 would have been $1,036,695. However, to accurately plan the FY 96 schedule and budget, the Navy would have had to anticipate the 86% price increase. Given the source and magnitude of the NOR adjustment, it is virtually impossible to accurately anticipate.

For accurate workload projections and efficient operations it is imperative to better control carryover adjustments.

B. PROCESS-IN PRESERVATION

Planning is essential before an aircraft arrives at AMARC in order to minimize costs. The aircraft's future use dictates the aircraft's level of initial preservation during Process-In. If an aircraft is to be a war reserve asset then it receives Type 1000 preservation; if the aircraft is identified for immediate reclamation storage then Type 4000 preservation will suffice. In Table 3.5, the immediate savings are significant if this determination is made prior to the aircraft's arrival. On average, Type 4000 preservation is 60% of the cost of Type 1000 preservation. Figure 3.9 illustrates the potential savings that can be realized by prior planning. The 14 aircraft were chosen from two types of TMSs that are being inducted in large numbers now and for the foreseeable future. All 14 aircraft arrived and were preserved at AMARC during FY 95. By the end of CY 95 nine of the aircraft were in Section 5 storage (Reclamation). For budget planning purposes, the figures in Table 3.6 are used, however, as

stated in Chapter III, the customer pays actual hours times the USP. The five A-6s in Section 1 had an average Process-In cost of $15,543.22 (planning figure for Type 1000 was $11,112), whereas the five aircraft in Section 5 had an average cost of $8,719.26 (planning figure for Type 4000 was $5,891). Although the actual costs were well above the planning figures, this cost data suggest that the aircraft storage requirements were largely identified prior to the aircrafts' arrival. In contrast to this scenario, the five F-14s in Section 1 had an average Process-In cost of $18,594.80 (planning figure for Type 1000 was $16,260), whereas the four aircraft in Section 5 had an average cost of $16,801.75 (planning figure for Type 4000 was $7,150). Although the actual preservation performed is unknown, the cost data suggests that at least eight of the nine aircraft received Type 1000 preservation. The DLH backs this assumption; the five Section 1 aircraft averaged 307.16 DLH, the average of eight of the F-14s (excluding AN1K0074 with 189.1 DLH) averaged 300.62. Assuming that three of the four Section 5 aircraft received Type 1000 preservation, and the planning figures were accurate, the Navy paid $27,330 for preservation not required.

When the future use of an aircraft is unknown, then it may be practical to provide the additional level of preservation to keep all options available, depending on the probability that the aircraft or parts will be reclaimed. If the likely future disposition of the aircraft is known, then all efforts should be made to ensure that the aircraft receives only the level of preservation it requires.

C. AIRCRAFT STORAGE

The Strike Board is responsible for aircraft inactive inventory management. All aircraft located at AMARC are reviewed on a semi-annual basis to determine appropriate storage, represervation, reclamation, sale, and disposal decisions, given current Navy doctrine and requirements. The actions of this board directly influence the Navy's AMARC costs. From the discussion in Chapter III, Section B, the costs savings resulting from the Strike Board recommendations (Figure 3.6) are immediate. All 26 F-4s were due for Represervation in FY 96.

The potential cost savings associated with each section are as follows:

Section 1 - This section is reserved for war reserve aircraft and aircraft with a high probability of regeneration. All aircraft are preserved in an inviolate status which restricts all but the highest priority reclamation of parts; replacement parts are required for all parts reclaimed. 82.7% of the Section 1 aircraft require full (type 10) represervation. Reclassifying the represervation type or transferring aircraft to another section would reduce costs.

Section 2 - This section is for CNO Special Project aircraft and a small percentage of FMS potential aircraft. 79.8% of the aircraft have had represervation waived (type 15). Parts reclamation is restricted to the highest priority requisitions, although replacement parts are not required. Transfer to Section 5 would make these aircraft available

for programmed reclamation. As with Section 1 aircraft, those requiring representation can be reclassified to type 15.

Section 3 - This section is dedicated to FMS/SAP aircraft. All aircraft not required to meet war reserve or reclamation criteria and which have resale potential to foreign militaries are stored here. 86.5% of the aircraft require some type of representation. If it is determined that an aircraft is unsuitable for the FMS program, transfer to Section 5 saves representation and maintenance costs and allows for unlimited parts reclamation.

Section 4 - This section is reserved for museum aircraft. All aircraft donated to a museum are classified to this section, all costs associated with maintenance and representation are charged to the recipient museum. Other than the space that Section 4 aircraft occupy and the minimum (type 40) representation requirements, there is very little cost to the Navy associated with Section 4 aircraft. Reclamation is available prior to a museum trade agreement.

Section 5 - This section is actually composed of two types of aircraft; those awaiting reclamation, and those that have completed reclamation and are in RIT status. Aircraft in Section 5 no longer require scheduled representation. Aircraft in RIT no longer require representation after priority reclamation. This is the least costly section in which to

maintain aircraft. The benefits of keeping aircraft indefinitely in this section exceeds that of disposal, which will be discussed later in this chapter.

In a Department of the Air Force Audit [Ref. 11], dated 26 May 1993, the Air Force's storage decisions came under criticism. The following conclusions and potential monetary benefits were determined:

> The Air Force is not fully utilizing excess aircraft and engines for reclamation of needed spare parts. This condition occurred because force programmers maintained aircraft in reconstitutable (high probability of withdrawal for future use) storage categories even though they have not identified future requirements. ... We concluded that the Air Force could reclaim parts from excess aircraft and engines and reduce requirements for spare parts procurement by $388 million. .. In addition to realizing a cost savings, the Air Force would move closer to meeting its inventory reduction goals by reclaiming spare parts already on hand at the AMARC to satisfy valid requirements instead of buying new spare parts.

This dollar value was determined by using a conservative estimate of 75% of the aircraft not supported by reconstitution or regeneration plans. A condemnation rate of 10% was applied, and a reclamation removal cost of $12.87 million (average of 3.6 DLH per item times the FY 93 reclamation USP of $48.31). There are opportunity costs of maintaining a large inviolate aircraft reserve which must be considered in the decision process.

Cost is not the primary criteria for determining the storage category, represervation schedule, or maintenance in storage requirements. Once an aircraft has been placed in storage at AMARC, the actual costs associated with maintaining the aircraft are minimal when compared to the potential those aircraft possess. In FY 95, $402,837.72 was spent on

representing and maintaining the greater than 1700 Navy aircraft located at AMARC. This is actually a small price for maintaining $24 Billion dollars worth of aircraft (average acquisition value). The majority of these funds were used to support Section 1 aircraft.

Section 1 aircraft are awaiting possible regeneration in the event of war, attrition, or breakthroughs in technology. Chapter I cited examples of war time regeneration. Normal attrition accounts for a small percentage of regenerations, primarily when out of production aircraft are lost and need to be replaced. Technological advancements is an area which holds tremendous potential for regenerating aircraft currently stored at AMARC due to out dated systems. Retrofitting these aircraft with new state of the art systems could render these aircraft a viable asset once again [Ref. 13]. With long lead times for new weapon platforms, these modified, regenerated aircraft could provide a stop gap until the new aircraft could be introduced in sufficient numbers.

The A-6E Intruder is a recent example of new technology rendering stored aircraft back to operational use. Throughout the life of the aircraft, A-6s were sent to AMARC because of a reduction in the Functional Life Expectancy (FLE) of the wings. This reduction in FLE reflects the structural weakening of the wings due to the quantity and magnitude of g force loading. As FLE is reduced, cracks begin to form and a safety limit is reached which forces the aircraft to be retired. In the mid 1980s, Boeing developed a replacement composite wing which could be retrofitted on existing airframes, restoring the aircraft to full capability. From 1985 to 1988, 30 A-6E aircraft were regenerated by AMARC and flown to Grumman Depots to have the composite wings fitted. The cost to regenerate and rewing each aircraft was less than 10% the cost of procuring a new aircraft.

Exercising sound judgement in the disposition of aircraft at AMARC requires careful consideration of all the factors and potential contingencies. Short-term savings must be balanced against potential long-term savings. Careful consideration must be given to protecting these decisions from the constraints imposed by a limited operating budget.

D. RECLAMATION TECHNIQUES

As discussed in Chapter II, there are three primary types of reclamation: programmed, priority, and the mini-save program. All forms of reclamation have the same objective; returning useable parts back into the supply system to reduce new parts procurement.

The Navy supports limited participation in the mini-save program, opting to store aircraft in an inviolate condition, or awaiting programmed or priority reclamation. In FY 95, 12 aircraft underwent programmed reclamation, with 52 projected for FY 96 and 46 for FY 97. Priority reclamation accounted for the majority of the Navy's reclamation efforts.

Although priority reclamation is the most effective form of reclamation (specific parts are reclaimed to fill an immediate requirement), it is the most cost inefficient. In FY 95, AMARC performed a total of 52,556 priority reclamations verses 39 programmed reclamations. The actual cost per DLH for priority reclamation was $59.95 compared to programmed reclamation of $55.95 (reclamation USP was $52.14). The DLH per item recovered is also higher for priority reclamation, when compared to programmed reclamation.

Programmed reclamation uses DLH more efficiently, and returns valuable parts to the active inventory before critical shortages create more costly priority reclamation requests. The MSL that is used to determine what parts are to be reclaimed is developed from

AMARC's DoD customers save lists. No consideration is given to parts that are above the Reorder Point (ROP) and would require storage, or to excess parts that have a commercial application and could be profitably sold by DRMO as useable parts. Selling profitable commercially adaptable parts which are not required to fill DoD needs would reduce DoD's component reclamation expenses.

The mini-save program returns aircraft parts back to the supply system at a lower condemnation or repairable rate. If the parts are removed immediately upon arrival, the material condition is already known, and time and the elements have not degraded their usefulness.

As discussed in Section C of this chapter, vision and sound judgement are critical in minimizing DoD's cost without sacrificing readiness.

E. PROCESS-OUT METHODS

Two Process-Out methods will be analyzed: disposal to DRMO, and the FMS program.

1. Disposal to DRMO

When an aircraft is no longer useful for reclamation or regeneration, the aircraft is offered for sale to DRMO. These are aircraft whose prior usage render them unsuitable for sale as a flyable aircraft. These aircraft are sold for their scrap metal value and the NRV of the remaining aircraft parts.

Prior to transferring an aircraft to DRMO, the Navy must prepare the aircraft for disposal. Costs vary from aircraft to aircraft, but include demilitarization, hazardous material

removal, and collecting all existing documentation for the aircraft. Proceeds from selling these aircraft are deposited in the U. S. Treasury Defense Business Operations Fund. The Navy does not receive any monetary benefit from selling the aircraft. An initial cash outflow without a corresponding cash inflow discourages the Navy from disposing of unusable, excess aircraft. Aircraft remain in storage indefinitely, taking up valuable space that could be used otherwise.

The current AMARC military manager hopes to dispose of unusable aircraft to free up valuable space. Without providing financial incentives, requests for voluntary disposal will fall on deaf ears until disposal of these aircraft is mandated. Possible solutions to encourage aircraft disposal are as follows:

- Allow the Navy to recover at least some of the revenue from these aircraft sales. Any DRMO profit (net income from the sale minus sales expenses) should be returned to, or shared with, the Navy. This will encourage the Navy to both dispose of these excess aircraft and to enhance their NRV by ensuring that all documentation accompanies the aircraft, assisting DRMO with research on commercial commonality of parts, and lending technical advise during the actual parts sale.
- Set up a separate AMARC or Navy O&M fund specifically for disposal.
- Allow AMARC to charge a form of rent for space used by each customer. This rent may be part of the G&A overhead allocated by the number of aircraft each customer has stored at AMARC. This will encourage all the customers to reduce the number of aircraft at the Center in an effort to reduce

their costs. Excess aircraft would become more of a financial liability to each customer. Decisions to dispose of these aircraft would balance retention costs (paying an annual rent) and the one time disposal charge.

2. FMS Program

The FMS program is coordinated by the International Programs Office (IPO) through the TMS Program Managers (PM) to FSO. At the Navy level, the IPO continuously markets excess aircraft to foreign countries. At the national level, the State Department uses the FMS/SAP programs as a foreign policy tool to gain access and influence in recipient countries.

The IPO arranges for foreign military buyers to visit AMARC. The FSO office acts as liaison for these visiting potential buyers. Revenue generated by FMS is returned to the U.S. Treasury, neither the Navy nor FSO realize a financial return. The FSO's only incentive to facilitate FMS aircraft sales is to reduce their workload--the more aircraft sold, the easier it is to maintain the existing aircraft.

When the U.S. Government purchases an aircraft, it is immediately expensed. Any value recovered from excess aircraft, above the costs of disposal, is profit. Profit generation, as well as friendly competition for FMS dollars with other AMARC customers has stimulated an active FMS program. Aircraft sold to foreign governments generate a higher rate of return than if sold through DRMO. The Defense Reutilization and Marketing Manual [Ref. 6] specifically states that Category D (combat configured) aircraft can only be sold for scrap and recovered as parts, not as flyable aircraft. FMS maximizes the return for a complete aircraft.

With an emphasis on maximizing revenue from excess aircraft, it is in the Navy's best interest to strongly pursue foreign government sales.

F. DRMO SALES PROCEDURES

The DRMS has the primary role in selling aircraft, including selecting the most appropriate sales method, catalog layout, and advertising. Much of this is left up to the local DRMOs, who 'specialize' in a particular product. In a 1994 GAO Report, Commercial Practices: Opportunities Exist to Enhance DoD's Sales of Surplus Aircraft Parts, [Ref. 11], the GAO compared Government surplus aircraft sales procedures and rate of return to those of commercial industry. The report was very critical of the DoD's, specifically DRMO's, sales methods and rate of return. The report's "results in brief" stated the following:

> ... DoD's proceeds from the sale of commercial-type surplus aircraft parts averaged less than 1 percent of what DoD paid for them. In contrast, commercial airlines realize proceeds on the order of 40 to 50 percent (based on the price of the part brand new) from the sale of comparable parts. ... little emphasis is placed on the training of disposal staff on the parts they are selling and the markets they are selling to.
>
> While not always directly comparable to DoD, commercial airlines have a system for selling surplus aircraft parts that reflects the profit incentive. The airlines we interviewed expect to obtain reasonable rates of return on the surplus aircraft parts they sell. They are concerned less with how quickly the property moves off the warehouse shelves.
>
> While it may not be practicable for DoD to duplicate commercial marketing techniques, it appears that DoD could substantially increase its proceeds by adopting some basic marketing practices. Critical to the success of such practices, however, will be some establishment or realignment of incentives. [Ref. 11]

The present system for aircraft parts sales has improved in the recent years, possibly initiated by this critical report. Although the government sales program has improved, the nature of the parts and the constraints with which DRMO must work preclude earning the high rate of return captured by their commercial counterparts. However, there are areas for improvement.

In an interview with the DRMO Tucson aircraft specialist [Ref. 14], she stated that the DRMS community has been rejuvenated. The new head of DRMS, Capt Hempson, has helped profits. A national sales meeting in November 1995 emphasized increasing marketing efforts. Better marketing techniques were promoted, including efficient parts lotting (by aircraft type as well as new and used), minimum acceptable bid criteria, and more effective advertising. It is important to note that all profits (sales revenue minus sales expenses) are deposited in the DRMS DBOF account, and that individual disposal offices do not benefit monetarily for their extra efforts to enhance sales. Also, all items are sold "as is," which is "guidance from above."

Areas which require specific evaluation include: resale of aircraft parts as useable, local marketing efforts, and legal complications.

1. Resale of Aircraft Parts as Usable

Before an aircraft part can be sold as usable, two conditions must be met; a market must exist for the aircraft parts, and the part's remaining usefulness must be validated. Military aircraft are designed for a unique combat mission. Many of the parts in these aircraft are unique to that aircraft or mission; there is no commercial counterpart. Without a

commercial use, the part is only as valuable as the material from which it is made (scrap value). Many parts do have commercial value. These are parts which; were purchased as Commercial-Off The Shelf (COTS) products, have a direct commercial application, or can be adapted or modified to fill a commercial requirement. The challenge lies in identifying marketable commercial-type parts and commercial applications. The customer is not required to identify commercial parts or their application at the time of sale. Presently, it is the DRMO's responsibility to research the marketability of surplus property (aircraft parts).

The DRMO office in Tucson has one dedicated aircraft sales specialist for this task. It is unrealistic to assume that one person working with over 50 TMS aircraft can effectively research the commercial application for all but the largest systems. Additional research into the commercial application of military parts should be conducted by the individuals with the greatest system specific technical knowledge--the aircraft-owning agency. As discussed earlier in this chapter, if the owning agency shares in revenue generated by selling their aircraft parts, they would be motivated to conduct the research. The research would pay for itself in higher returns. GAO [Ref. 11] "... interviewed 26 buyers of DoD surplus aircraft parts and found that 88% of the buyers resell them as useable property."

A recent example of a commercial application earning higher returns comes from an article from the DRMS World [Ref. 15] which stated:

> J-57 engines have historically sold for $200 each through International Sales. Sandra Ginder, an aircraft specialist at DRMO Tucson, conducted a study to determine the recyclable metal content of the engines and the fair market price for the material. She also determined the current use for the engines and the value to the private sector. ... Her investigation concluded that the historical sales value was significantly below the current market price. As a result of her investigation, she recently placed a much higher minimum

> bid, and it paid off!!! Instead of the historical average price of $200, nearly 900 engines sold for an average of $1,852 each. Ginder's analytical abilities and knowledge of sales pricing added an extra $1.5 million to DBOF.

Another example is commercial applications for the J-79 jet engine. This example is from a DRMS Invitation for Bids [Ref. 16]:

> 3. ENGINE, TURBOJET, J-79, TRAILER MOUNTED: General Electric engine, Series 15. Derivatives of the J-79 have been the CJ805-3 turbojet and CJ805-23 turbofan, powering the Convair 880 and 990, as well as the LM1500 industrial and marine turbine. RADIOACTIVE EXCITERS REMOVED. NO RECORDS AVAILABLE.

There are a total of 271 J-79 engines for sale in this Invitation for Bids [Ref. 16]. The average resale value, estimated at $6,000 per engine, exceeds that of the original scrap value by more than $5,500. The additional revenue generated by this research will yield an estimated $1.49 million dollars. These examples illustrate only two of the thousands of aircraft parts DRMO sells; additional revenue may be obtained from many of the other parts if the owning agency conducted market research, or additional staff was hired by DRMO specifically for this task.

Documentation is another area which closely follows the commercial applicability of a surplus aircraft part. "All available aircraft historical / modification records shall be transferred to the DRMO with the aircraft" [Ref. 6]. In an interview with DRMO personnel [Ref. 14] it was stated that DRMO "... does not insist on paperwork, if it (the aircraft) comes with documentation it is a plus." Tactical aircraft documentation must be destroyed along with the aircraft (to the point it cannot be regenerated). Therefore, not much emphasis placed on providing this documentation even though the parts may be sold separately (i.e., engines).

The transferring agency does "... make every effort to provide documentation for commercial aircraft." [Ref. 14] Complete documentation increases resale potential. According to the FAA [Ref. 7], "... life-limited parts may be used (for aviation) for the remaining time left on the parts providing the record of time is clearly reflected in the aircraft log books." Emphasis should be placed on providing all records for all transferred aircraft. Furthermore, DRMO only states whether documentation is/is not available; not whether it is complete. This increases the buyer's risk, and lowers the bids. The record's completeness should directly correlate with the bids received.

FAA certification, or potential for certification (Category E aircraft) greatly influences the realizable value of complete aircraft. DRMO solicits FAA certifications for all Category B and E aircraft for sale. However, the response time from the FAA office in Phoenix has not been expeditious. Several years ago, DRMO requested FAA certification for three Category B aircraft, but the FAA didn't respond for over two years. Better coordination is required between DRMO and the FAA to capture the highest return.

2. Local Marketing Efforts

As already mentioned, the number one priority for the DRMS community is marketing aircraft and aircraft parts to achieve the highest NRV. Improvements have already been noted since the earlier cited GAO report [Ref. 11]. Three important areas include: sales incentives, market analysis, and marketing techniques.

The question of financial incentives is analogous to the discussion in section E, Sub-section 1, of this chapter. There are few incentives for DRMO to effectively market and

optimize the prices received for aircraft and aircraft parts. DRMO's disposal system is often geared more toward moving the property within established time frames than maximizing proceeds. If the primary focus was on financial return and the local DRMO shared in the profits, NRV would likely be higher.

A market analysis was recently conducted to determine the optimum price and quantity for selling UH-1s. The Air National Guard will begin retiring their UH-1 helicopters and DRMO Tucson is a possible single site selling agent. The sale will involve over 1,000 helicopters over a short period of time. DRMO sold one UH-1 helicopter for $135,000 (14% of original cost) as a test case. DRMO has determined that only five UH-1s can be sold per month without saturating the market.[Ref. 14] Analysis of this type is significant to maximizing the recoverable value of a large scale program.

Local marketing techniques are focused on the customer. Proper advertising expands the customer base and attracts the most promising bidders. Chapter II, Section D, describes the mechanics of the process. Assisting NSO with Bidder Lists, and providing sufficient product detail increases the probability of attracting active bidders.

Properly lotting parts will also enhance sales. By packaging like products, bids should be higher. The exception to this is the matter of economics. DoD procedures allow placing multiple parts into a sales lot when it is uneconomical to sell the parts individually.

DRMO office can also deny any and all bids if they are too low. Minimum acceptable bids can be set and advertised. In a recent advertisement for salvageable B-52 aircraft, the following was stated; "minimum Acceptable Bid - 70% of American Metal

Market, Los Angeles, California - Old Aluminum Sheet and Cast on 28 September 1995" [Ref. 16]. Limited space is a constraint as far as holding out for a higher price / better market.

3. Legal Implications

There are several legal areas for concern surrounding the Government sales of excess aircraft and aircraft parts. The scope of this thesis does not include this area. However, a minimal understanding of the complexity of the situation is required. The general consensus derived during this research is that the U.S. Government is not willing to risk potential litigation in the pursuit of higher financial returns.

For complete aircraft sales, the Defense Disposal Manual [Ref. 6] states that the DoD does not assume any liability or in any way represent the aircraft as meeting, or being capable of meeting, the Federal Aviation Administration Standard Airworthiness Certification requirements. Any person who purchases these aircraft must demonstrate that the aircraft conforms to the FAA Type Certificate and is in a condition for safe operations.

The sale of surplus aircraft parts as scrap has come under pressure. A recent GAO report [Ref. 11] and trade publication articles [Ref. 17 & 18] addressed the matter of unintentional government involvement in counterfeit aircraft parts. There were instances where DoD aircraft parts, sold as scrap, illegally reentered civil aviation as usable.

> ... financial motives can lead unscrupulous individuals to illegally refurbish or clean up DoD scrap aircraft parts and pass them off in the civil aviation market as useable. Such parts, which would cost thousands of dollars if useable, can be acquired for pennies per pound as scrap. [Ref. 11]

It was stated that DoD does not have procedures to prevent improperly using scrap once it is sold, and there is no policy for mutilating or destroying flight-critical parts sold as scrap. Although the Government has no control over scrap parts once they are sold, there are two methods which control potential misuse of scrap parts; a mutilation policy and an End Use Agreement. DRMO requires all flight critical parts not sold as useable to be mutilated prior to removal by the purchaser. This mutilation policy has gotten "real big" in the past year and a half. Mutilation instructions are presented in the invitation for bid. The requirement for mutilation prior to removal adversely affects the bid price. [Ref. 14]

The Government also requires the buyer to sign an End Use Agreement. This is a contract stating how the buyer plans to use the parts. [Ref. 14]

V. RECOMMENDATIONS AND CONCLUSIONS

A. REVIEW OF FINDINGS

1. Primary Research Question

What is the optimum program for maximizing the economic value of excess Naval aircraft located at the Aerospace Maintenance and Regeneration Center?

There are many areas which can be improved to optimize the recovery value of excess Naval aircraft, these areas include:

- stabilizing DBOF rates from year to year
- improving predictions regarding the aircraft's future use prior to the aircraft's arrival at AMARC
- reviving the Mini-Save program
- increasing programmed reclamation while reducing costly priority reclamation
- including commercially adaptable parts in MSL for sale by DRMO
- continually screening aircraft for reduced cost requirements
- allowing the Navy to benefit financially from the sale of aircraft and aircraft parts by DRMO
- increasing the FMS Program

2. Secondary Research Questions

a. How is the aircraft parts reclamation program managed at AMARC?

The aircraft parts reclamation program is managed by AMARC. ASO can request specific parts to fill priority requirements and schedule programmed reclamation projects.

b. How can DoD maximize the return from the reclamation program?

By revitalizing the Mini-Save Program, increasing programmed reclamation, and reducing priority reclamation.

c. How are excess aircraft and aircraft parts disposed of after parts are reclaimed?

The Navy must first incur disposal costs associated with release to GSA or DRMO. GSA screens all aircraft for sales potential as flyable aircraft before releasing them to DRMO. DRMO disposes of the majority of the aircraft and aircraft parts. Aircraft and aircraft parts are sold to the public by sealed bid or auction.

d. What are the costs associated with reclamation and disposal of excess aircraft at AMARC?

The costs associated with reclamation and disposal are computed by multiplying the specific USP by the DLHs involved in the process. The tasks which must be performed for reclamation and/or disposal include:

- removing the part (reclamation)
- inspecting and preparing the part (reclamation)
- shipping the part (reclamation)
- represerving the aircraft (priority reclamation)
- removing hazardous material and demilitarizing the aircraft or part (disposal)
- moving the aircraft or aircraft parts (programmed reclamation or disposal)

e. Are there any constraints which hinder the sale of aircraft and aircraft parts?

The Government's fear of possible legal repercussions from selling excess useable aircraft parts reduces the potential return from aircraft parts sales.

f. How does the private sector differ from DoD in the disposition of excess aircraft parts?

Parts sold by private sector aircraft companies are commercially adaptable, whereas the majority of the military parts are not. Private sector companies are encouraged by profit incentives to increase the return from excess aircraft parts. The Navy does not profit financially from the sale of aircraft parts, therefore they lack the incentive to pursue the highest NRV.

g. Is the DoD making every effort to sell excess aircraft and aircraft parts at maximum net realizable value (NRV)?

To achieve the highest NRV, DoD must ensure the following:

- full cooperation between DRMO and the owning service
- incorporating commercially adaptable parts into the MSL
- extensive research into the commercial application of excess military aircraft parts
- focusing marketing efforts on revenue generation

B. RECOMMENDATIONS

The following recommendations are offered to increase the NRV of excess Navy aircraft stored at AMARC. The rationale behind most of these recommendations were presented in Chapter IV. The recommendations are:

- Stabilize the DBOF rates or adjust FSO's budget to match cost fluctuations. Either solution will control the resultant inverse workload deviations which results in the "death spiral" effect.
- Develop a long-term plan for the future use of all incoming aircraft. This will ensure that the aircraft only receive the necessary preservation, reducing process-in costs associated with excessive preservation.
- Continue to screen all excess aircraft stored at AMARC for future usage.

- Revitalize the Mini-Save reclamation program. This will ensure that reclaimed parts are in full operational condition, minimizing physical deterioration due to time and the elements.
- Increase timely programmed reclamation. Programmed reclamation is less costly than priority reclamation. This is especially cost effective for both TMSs that are still operational and the excess aircraft designated early as reclamation candidates.
- Include commercially adaptable parts in the MSL that will not be required by DoD. These parts should be transferred to DRMO for sale to the private sector as usable.
- Allow the Navy to share in the revenues generated from selling excess aircraft and aircraft parts. Revenue sharing will increase the incentive to provide documentation and technical support, this enhances the salability of the excess aircraft and aircraft parts, increasing the NRV. Revenue sharing will also help offset the Navy's disposal costs, encouraging the Navy to reduce its inventory deemed economically worthless.
- The Navy realizes the highest NRV for excess aircraft by selling fully operational products. Considering that the private sector is excluded from purchasing flyable combat aircraft, the Navy should increase its foreign military sales efforts.
- Research the commercial adaptability of excess parts. Identifying commercial application for a part increases its value. Potential sources of the necessary

expertise and manpower are Naval Air Reserve units assigned to maintenance commands. Another alternative would be to increase DRMO or FSO manpower specifically for this task, providing the extra revenue generated exceeds the cost of the additional personnel.

- Study the cost effectiveness of testing and certifying aircraft parts for sale to the private sector. This can begin with large quantity sales of high value items (i.e., 271 J-79 jet engines). Testing and certifying parts reduces the buyer's risk, increasing the expected bid and NRV.

  For many older components, the test equipment is excess itself. Therefore, expenditures would be that required to bring the test equipment back to operational use.

- Increase DRMO storage capability. This will allow DRMO to store aircraft parts until a higher sales value can be achieved.
- Return a portion of the revenue received from the sale of excess aircraft and aircraft parts to the local DRMO. These funds can be used to fund market research, parts testing and certification, and other actions which would increase future returns. This is analogous to the use of retained earnings in the corporate environment.

C. RECOMMENDATION FOR FURTHER STUDY

Areas requiring further study which have been included in the recommendations or mentioned within the context of this research include:

- develop a more efficient DBOF rate adjustment process
- analyze the costs and benefits of an aircraft parts testing and certification program
- identify the legal implications of selling usable excess aircraft and aircraft parts to the private sector

D. CONCLUSIONS

The entire process of storing, regenerating, reclaiming, and disposing of excess aircraft and aircraft parts at AMARC is a valuable operation. By exploring alternate strategies, the Government can realize a greater rate of return. The recommendations presented are not revolutionary, they are reasonable suggestions that if embraced completely, or in part, will yield a greater return than is presently realized.

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